Le CENTRE d'ÉDUCATION en
MATHÉMATIQUES et en INFORMATIQUE

Problème de la semaine
Problèmes et solutions
2020 - 2021

(solutions disponibles en anglais seulement)

Problème B (5e/6e année)

Thèmes

Sens du nombre (N)
Géométrie (G)
Algèbre (A)
Gestion des données (D)
Pensée computationnelle (C)

(Cliquer sur le nom du thème ci-dessus pour sauter à cette section)

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*Les problèmes dans ce livret sont organisés par thème.
Un problème peut apparaître dans plusiers thèmes.

Sens du nombre (N)

Problème de la semaine

Problème B

C'est beaucoup de lecture

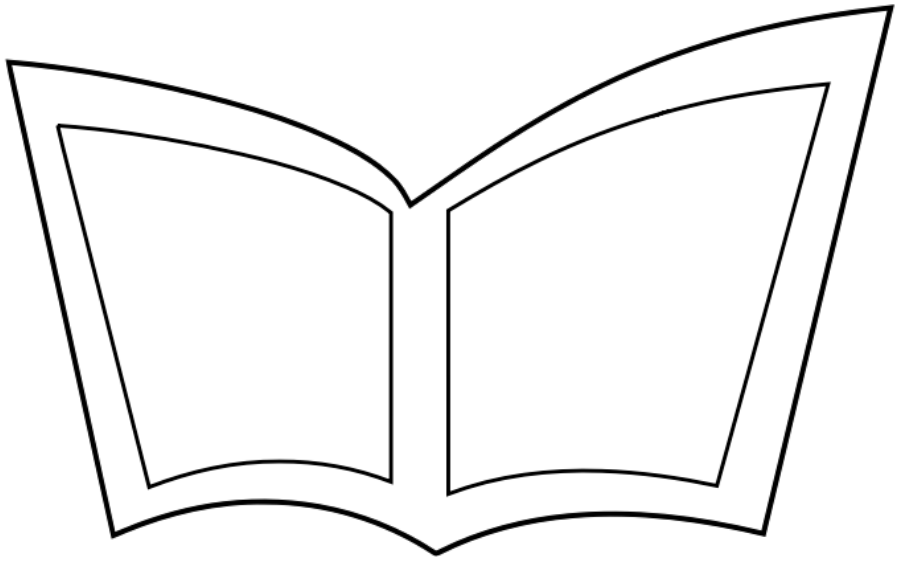
La première revue de National Geographic a été publiée en septembre 1888.

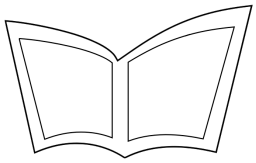
a) Suppose qu'une nouvelle édition de la revue ait été publiée chaque mois depuis sa première publication. Si tu possédais une copie de chaque revue, combien de revues National Geographic aurais-tu par la fin de cette année? C'est-à-dire, combien de revues y aurait-il dans une collection complète de septembre 1888 à décembre 2020?

b) Suppose que chaque revue contienne 145 pages. Combien de pages y a-t-il dans une collection complète?

c) Suppose que chaque revue ait une épaisseur de 5 mm. Si tu empiles toutes les revues d'une collection complète l'une par-dessus l'autre, la pile sera-t-elle plus grande que la hauteur de ta salle de classe? Explique ton raisonnement.

d) Suppose que chaque revue National Geographic mesure 25, 5 cm de hauteur. Si toutes les revues d'une collection sont placées bout à bout, feront-elles le tour d'une piste de 400 m?





Problem of the Week
Problem B and Solution
That's A Lot of Reading

Problem

The first National Geographic magazine was published in September 1888.

a) Assume that the magazine was published every month of each year since the first publication. By the end of this year, how many National Geographic magazines would you have if you had one copy of each magazine? That is, how many magazines would be in the complete collection from September 1888 to December 2020?

b) Assuming each magazine has 145 pages, how many pages would be in one complete collection?

c) Assume that each issue is approximately 5 mm thick. If you stacked the magazines from one complete collection one on top of the other, would the pile be taller than your classroom? Explain your reasoning.

d) Assume that each National Geographic magazine is 25.5 cm tall. If you laid the magazines from one complete collection end-to-end, would they go around a 400 m track?

Solution

(a) The complete collection would be as follows:
1888: 4 issues
1889 to 2020: 12 issues each year $\times$ 132 years $=$ 1584 issues
Thus, there would have been a total of $4 + 1584 = 1588$ issues between September 1888 and December 2020.

(b) There would be 1588 issues $\times$ 145 pages per issue $=$ 230 260 pages in one complete set.

(c) The total height would be 1588 issues $\times$ 5 mm thick $=$ 7940 mm or 7.94 m. Unless your classroom has a cathedral ceiling, the magazine stack would be higher than your classroom ceiling.

(d) The distance covered by laying the magazines end-to-end would be 1588 issues $\times$ 25.5 cm $=$ 40 494 cm or 404.94 m, which is about 5 m longer than a 400 m track.

Problème de la semaine

Problème B

Tes dents, en prendre soin tu dois.

Certains dentistes suggèrent de se brosser les dents deux fois par jour pendant 2,5 minutes.

Pour ces problèmes, suppose que cette recommandation est respectée. Suppose aussi qu'il n'y a pas d'années bissextiles.

a) D'après cette recommandation, combien de secondes devrait-on passer à se brosser les dents par jour?

b) Combien d'heures passerais-tu à te brosser les dents dans une année?

c) Ces 25 dernières années, environ combien de jours ce joueur de hockey a-t-il passé à brosser les dents qu'il lui reste?

d) Maître Yoda avait environ 900 ans. Quotidiennement, ses dents il a brossé. Pendant combien de semaines aurait-il brossé ses dents durant sa vie?

LISTE DE CONVERSION DE TEMPS: (Tu peux rechercher ceux que tu ne connais pas déjà.)

_____ secondes = 1 minute
_____ heures = 1 jour
_____ jours = 1 semaine
_____ jours = 1 an
_____ semaine = 1 an

THÈMES GÉOMÉTRIE, SENS DU NOMBRE

Problem of the Week
Problem B and Solution
Your Teeth, You Must Care For

Problem

Some dentists recommend that you brush your teeth twice a day for 2.5 minutes each time. Assume for these problems that this recommendation has been followed. Also assume there are no leap years.

a) How many seconds per day of brushing are required by this recommendation?

b) About how many hours would you brush your teeth in a year?

c) Over the past 25 years, for about how many days would this hockey player have brushed what teeth he has?

d) Yoda was about 900 years old. Regularly, his teeth he did brush. For about how many weeks would he have brushed his teeth throughout his life?

Solution

a) It is recommend that you brush for 2.5 minutes twice per day, for a total of 5 minutes per day. The recommended number of seconds per day is
5 minutes per day $\times$ 60 seconds per minute $=$ 300 seconds per day.

b) The recommended number of minutes per year is
5 minutes per day $\times$ 365 days per year $=$ 1825 minutes per year.
This is equal to 30 hours and 25 minutes, or $30\frac{5}{12}$ hours $\approx$ 30.42 hours.
Alternatively, 5 minutes is equal to $\frac{1}{12}$ of an hour, giving
$\frac{1}{12}$ hours per day $\times$ 365 days $= \frac{365}{12}$ hours or $30\frac{5}{12}$ hours.

c) The number of hours of brushing in 25 years is equal to
$\frac{365}{12}$ hours per year$\times$ 25 years $= \frac{9125}{12}$ hours $= 760\frac{5}{12} \approx 760.42$ hours. This gives a total of $\frac{9125}{12}$ hours $\div$ 24 hours per day $\approx$ 31.7 days, slightly less than 32 days.

d) The number of hours of brushing in 900 years would be
$\frac{365}{12}$ hours per year $\times$ 900 years $= \frac{328\,500}{12} = 27\,375$ hours of brushing.
This gives 27 375 hours of brushing $\div$ 24 hours per day $=$ 1140.625 days of brushing.
This is equal to 1140.625 days of brushing $\div$ 7 days per week $\approx$ 162.95 or almost 163 weeks of brushing.

Problème de la semaine

Problème B

Trouver sa place

Résous les casse-têtes suivants en utilisant les chiffres entre 1 et 9 pour remplir les cases de façon à ce que chaque expression horizontale et verticale soit vraie. Dans chaque casse-tête, utilise chaque chiffre une seule fois et applique les opérations en respectant l'ordre dans lequel elles apparaissent, de gauche à droite et de haut en bas.

a)

	+	6	x		=	56
+		+		−		
	−		+		=	12
÷		x		x		
	+		−		=	4
=		=		=		
5		50		3		

b)

	+		x		=	52
+		−		+		
	−		+		=	14
÷		x		÷		
7	+		÷		=	5
=		=		=		
2		21		5		

Dans le casse-tête a), l'emplacement du chiffre 6 est donné, donc les huit cases vides devront être remplies avec les chiffres de 1 à 9, sauf 6. Dans le casse-tête b), l'emplacement du chiffre 7 est donné, donc les huit cases vides devront être remplies avec les chiffres de 1 à 9, sauf 7.

Problem of the Week
Problem B and Solution
'Place' Value

Problem

Complete the puzzles below by entering the digits from 1 through 9 in the blank boxes to make all the horizontal and vertical statements true. In each puzzle, use each digit just once and do the operations in the order that they appear, from left to right and from top to bottom.

a)

	+	6	x		=	56
+		+		−		
	−		+		=	12
÷		x		x		
	+		−		=	4
=		=		=		
5		50		3		

b)

	+		x		=	52
+		−		+		
	−		+		=	14
÷		x		÷		
7	+		÷		=	5
=		=		=		
2		21		5		

In puzzle a), the location of the digit 6 has been given, so the eight empty boxes each contain a different digit from 1 through 9, other than 6. In puzzle b), the location of the digit 7 has been given, so the eight empty boxes each contain a different digit from 1 through 9, other than 7.

Solution

First, we will give you the final grids.

a)

1	+	6	x	8	=	56
+		+		−		
9	−	4	+	7	=	12
÷		x		x		
2	+	5	−	3	=	4
=		=		=		
5		50		3		

b)

5	+	8	x	4	=	52
+		−		+		
9	−	1	+	6	=	14
÷		x		÷		
7	+	3	÷	2	=	5
=		=		=		
2		21		5		

On the next page we will give a solution for each grid.

For puzzle a):
Label the unknown values with the letters shown below.

a	+	6	×	b	=	56
+	■	+	■	−	■	■
c	−	d	+	e	=	12
÷	■	×	■	×	■	■
f	+	g	−	h	=	4
=	■	=	■	=	■	■
5	■	50	■	3	■	■

Let's start with g. From the second column, we see that g must be 1, 2, or 5, since these are the only digits that divide into 50.
If $g = 1$, then $6 + d$ must be 50. This is not possible since d must be a single digit.
If $g = 2$, then $6 + d$ must be 25. This is not possible since d must be a single digit.
If $g = 5$, then since $10 \times 5 = 50$, $6 + d$ must be 10, and so $d = 4$. This is possible.
Therefore $g = 5$ and $d = 4$. We add these to the grid.

a	+	6	×	b	=	56
+	■	+	■	−	■	■
c	−	4	+	e	=	12
÷	■	×	■	×	■	■
f	+	5	−	h	=	4
=	■	=	■	=	■	■
5	■	50	■	3	■	■

Next, we'll look at b. From the first row, we see that b must be 1, 2, 4, 7 or 8, since these are the only digits that divide 56. However, b cannot be 4 since $d = 4$. Also, b cannot be 1 or 2 because then $a + 6$ must be 56 or 28, which are both not possible since a must be a single digit. Therefore, $b = 7$ or $b = 8$.
If $b = 7$, then $a + 6$ must be 8, and so $a = 2$.
If $a = 2$, then $c = 3$ and $f = 1$ or $c = 8$ and $f = 2$.
However, if $c = 3$, then $e = 13$. Since 13 is not a digit, this is not possible.
If $c = 8$, then both $a = 2$ and $f = 2$, which is not possible. Therefore, b cannot be 7.
Therefore, $b = 8$ and $a + 6$ must be 7, and so $a = 1$. We add these to the grid.

1	+	6	×	8	=	56
+	■	+	■	−	■	■
c	−	4	+	e	=	12
÷	■	×	■	×	■	■
f	+	5	−	h	=	4
=	■	=	■	=	■	■
5	■	50	■	3	■	■

Next, we'll look at c. From the first column, we know that $1 + c$ is a multiple of 5. This means c is either 4 or 9. Since $d = 4$, c cannot be 4.
Therefore, $c = 9$.
Since $c = 9$, then since $10 \div 2 = 5$ we must have $f = 2$.
From the second row, since $c = 9$, then $e = 7$.
From the third row, since $f = 2$, then $h = 3$ and the grid is now complete.

1	+	6	×	8	=	56
+	■	+	■	−	■	■
9	−	4	+	7	=	12
÷	■	×	■	×	■	■
2	+	5	−	3	=	4
=	■	=	■	=	■	■
5	■	50	■	3	■	■

For puzzle b):

Label the unknown values with the letters shown below.

A	+	B	×	C	=	52
+		−		+		
D	−	E	+	F	=	14
÷		×		÷		
7	+	G	÷	H	=	5
=		=		=		
2		21		5		

Let's start with G. From the second column, G must be a 1, 3 or 7 since they are the only single digits that divide into 21.
If $G = 1$, then $B - E$ must be 21. This is not possible since B and E must be single digits.
Also, G cannot be 7 since the digit 7 is already in the grid.
Therefore, $G = 3$. Looking at the third row, since $G = 3$ and $10 \div 2 = 5$, then $H = 2$. We add these to the grid.

A	+	B	×	C	=	52
+		−		+		
D	−	E	+	F	=	14
÷		×		÷		
7	+	3	÷	2	=	5
=		=		=		
2		21		5		

Next, we'll look at C. From the first row, C must be 1, 2, or 4, since they are the only single digits that divide into 52.
If $C = 1$, then $A + B$ must be 52. This is not possible since A and B must be single digits.
Also, C cannot be 2 since the digit 2 is already in the grid.
Therefore, $C = 4$.
From the third column, since $10 \div 2 = 5$, then $4 + F$ must be 10. This means $F = 6$. We add this to the grid.

A	+	B	×	4	=	52
+		−		+		
D	−	E	+	6	=	14
÷		×		÷		
7	+	3	÷	2	=	5
=		=		=		
2		21		5		

The numbers we have not used yet are 1, 5, 8, and 9. Using the second column, we see $B - E$ must be 7 since $21 \div 3 = 7$. The only two remaining numbers that can make this equation true are $B = 8$ and $E = 1$.
From the first row, since $13 \times 4 = 52$, $A + 8$ must be 13, and so $A = 5$. This leaves $D = 9$ and the grid is now complete.

5	+	8	×	4	=	52
+		−		+		
9	−	1	+	6	=	14
÷		×		÷		
7	+	3	÷	2	=	5
=		=		=		
2		21		5		

Problème de la semaine

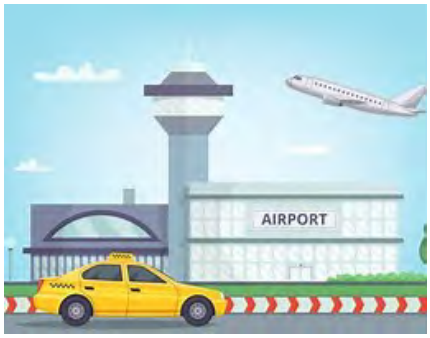
Problème B

Un bon coup à bon coût

Trois frères, Andy, Bob et Curly prennent un taxi ensemble pour se rendre de l'aéroport à leurs maisons.

Leurs maisons se situent sur le même trajet.

— La maison d'Andy est à 21 km de l'aéroport,
— la maison de Bob est à 42 km de l'aéroport et
— la maison de Curly est à 63 km de l'aéroport.



Si le coût du taxi est de 2,00$ par km, tente de trouver au moins deux façons différentes de séparer le coût du trajet entre les trois passagers (sans considérer le pourboire), en t'assurant que ce soit juste.

Problem of the Week
Problem B and Solution
Fare's Fair!

Problem

Three brothers, Andy, Bob, and Curly, take a taxi together home from the airport.

Their homes lie along the same route;

- Andy's is 21 km from the airport,
- Bob's is 42 km, and
- Curly's is 63 km.

If the taxi fare is \$2.00 per km, try to find at least two possible fair ways for each of the three travellers to pay the driver (not including the tip)?

Solution

The total cost is \$2 per km $\times$ 63 km = \$126. Here are three possible ways to pay the driver.

Solution 1:
If each passenger pays $\frac{1}{3}$ of the total cost, then they each pay \$126 $\div$ 3 = \$42.

Solution 2:
Three passengers travel the first $\frac{1}{3}$ of the trip (21 km) for \$42, so each pays \$42 $\div$ 3 = \$14 for that portion of the trip. So Andy pays \$14.
Two passengers travel the next 21 km for \$42, so each pays \$42 $\div$ 2 = \$21 each for that portion of the trip plus \$14 for the first portion of the trip. So Bob pays \$21 + \$14 = \$35.
Only one passenger, Curly, travels the final 21 km for \$42. So Curly pays \$14 + \$21 + \$42 = \$77 for all three portions of the trip.
Notice the total paid is \$14 + \$35 + \$77 = \$126.

Solution 3:
A third possibility is that they each pay according to their distance travelled. Andy travels 21 km, Bob travels 42 km, and Curly travels 63 km, a total of 21 + 42 + 63 = 126 km. Thus it would cost \$126 $\div$ 126 km = \$1.00 per km per person. So Andy pays \$21, Bob pays \$42, and Curly pays \$63.

Problème de la semaine

Problème B

Des paniers des fêtes

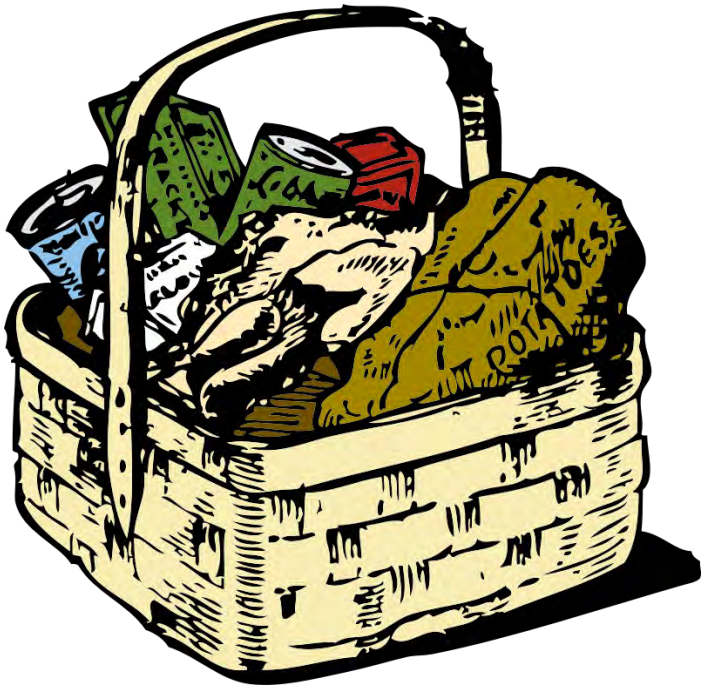
Le mois de décembre est un mois de générosité pendant lequel plusieurs personnes offrent des paniers des fêtes. Suppose qu'en 2019 une communauté du sud de l'Ontario composée de 35 000 personnes a donné 1400 paniers aux familles de la communauté.

a) Si la masse d'un panier pour une famille est 13 kg, quelle est la masse totale de tous les paniers donnés en 2019?

b) Si un foyer typique consiste en moyenne de 4 personnes, combien de foyers y a-t-il dans cette communauté?

c) Quel pourcentage des foyers de cette communauté a reçu un panier en 2019? Suppose qu'aucun foyer ne reçoit plus d'un panier.

d) Si la communauté avait une population d'un million, combien de paniers, penses-tu, seraient distribués dans la communauté?



Problem of the Week
Problem B and Solution
Care Package Data

Problem

December brings a time when many people feel generous and send care packages to others. Suppose that one community of 35 000 people in Southern Ontario handed out 1400 care packages to families within that community in 2019.

a) If the mass of a care package for one family is 13 kg, what is the total mass of all the family care packages distributed in 2019?

b) If an average household has 4 people in it, how many households are in this community?

c) What percentage of households in this community received a family care package in 2019? Assume that no household receives more than one care package.

d) If the community had a population of one million, how many care packages might you predict the community would hand out to families within that community?

Solution

a) The total mass of family care packages distributed is
1400 care packages $\times$ 13 kg per package $=$ 18 200 kg.

b) The number of households in this community is
35 000 people $\div$ 4 people per household $=$ 8750 households.

c) The percentage of households that received a family care package is
(1400 received care packages $\div$ 8750 total households) $\times$ 100% $=$ 16%.

d) This community would have
1 000 000 people $\div$ 4 people per household $=$ 250 000 households.
To determine the predicted number of family care packages, we will use the 16% found in part c).
Since 16% of the households received a care package, for every 100 households we would predict that there will be 16 households that receive a care package.
Now 250 000 $\div$ 100 $=$ 2500, so there will be 2500 $\times$ 16 $=$ 40 000 households that receive a family care package.
A second way to solve this question is to note that 16% $=$ 0.16. Thus, the number of households predicted to receive a family care package is
250 000 households $\times$ 0.16 $=$ 40 000 households.

Problème de la semaine

Problème B

Les livres d'Aisha

Aisha passe la semaine au chalet et aimerait lire son livre préféré qui a 400 pages.

a) Si elle lit une page en 36 secondes, combien d'heures lui faudra-t-il pour lire son livre?

b) Suppose qu'Aisha lit seulement entre 10h15 et 14h10 et ensuite entre 19h20 et 21h00 à tous les jours, en commençant par lundi. Quel jour et à quelle heure aura-t-elle terminé son livre?

c) Aisha décide de lire un deuxième livre de 350 pages et commence à en faire la lecture immédiatement après avoir terminé son premier livre. Si elle continue à lire au même rythme, quand aura-t-elle terminé le deuxième livre?

Problem of the Week
Problem B and Solution
Aisha's Books

Problem

Aisha is spending a week at her family's cottage and wants to read her favourite book, which is 400 pages long.

a) If she reads one page every 36 seconds, how many hours will it take her to read her book?

b) Suppose Aisha only reads from 10:15 a.m. to 2:10 p.m., and from 7:20 p.m. to 9:00 p.m. each day, starting on Monday. On what day and at what time will she finish reading her book?

c) Aisha decides to read a second book that is 350 pages in length, starting right after finishing her first book. If she continues to read at the same speed, then when will she finish her second book?

Solution

a) At a rate of one page every 36 seconds, 400 pages will take Aisha $400 \times 36 = 14\,400$ seconds, or $14\,400 \div 60 = 240$ minutes or $240 \div 60 = 4$ hours to read.
Note: Another way to solve this problem is to notice that since there are 60 seconds in a minute and 60 minutes in hour, there are $60 \times 60 = 3600$ seconds in an hour. We could then find the number of hours by calculating 14 400 seconds $\div$ 3600 seconds per hour, which equals 4 hours.

b) The number of hours between 10:15 a.m. and 2:10 p.m. is 3 hours (from 10:15 to 1:15), plus 55 minutes (from 1:15 to 2:10). Thus Aisha will need another 5 minutes to finish the book. Therefore, she will finish at 7:25 p.m. on Monday. This is five minutes after she starts again at 7:20 p.m.

c) The second book will take Aisha $350 \times 36 = 12\,600$ seconds, which is equal to $12\,600 \div 60 = 210$ minutes, or 3 hours and 30 minutes.
Since she will start reading at 7:25 p.m. on Monday, Aisha will have 1 hour and 35 minutes, or 95 minutes, to read between 7:25 and 9:00 p.m. on Monday.
Aisha will need another $210 - 95 = 115$ minutes, or 1 hour and 55 minutes, to finish her second book.
Starting at 10:15 a.m. on Tuesday and reading for 1 hour and 55 minutes will take her until 12:10 p.m. So she will be done her second book at 12:10 p.m. on Tuesday.

Problème de la semaine

Problème B

Intérêt-ssant!

Monique et Tyrel sont nés la même journée. La journée de leur premier anniversaire, les parents de Monique ont ouvert un compte de banque à son nom qui accumule 10% d'intérêt par année. À partir de ce jour, les parents de Monique ont déposé 100$ dans son compte de banque à chacun de ses anniversaires, jusqu'à son sixième. Ensuite, l'argent est resté dans le compte mais ses parents n'en ont plus ajouté.

Les parents de Tyrel ont attendu son sixième anniversaire avant d'ouvrir un compte semblable pour lui. À partir de ce jour, ses parents ont déposé 100$ dans son compte de banque à chacun de ses anniversaires. Le compte de Tyrel accumule aussi 10% en intérêt par année.

Complète les deux tableaux pour déterminer le montant total d'argent dans les comptes de Monique et de Tyrel. Quelle stratégie d'économie est la meilleure après 15 ans?

Pour te simplifier la tâche, arrondis l'intérêt au dollar près pour chaque année.

Monique

Année	Montant au début de l'année ($)	Intérêt accumulé ($)	Nouveau total à la fin de l'année ($)
1	100	10	110
2	210	21	231
3	331	33	364
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

Tyrel

Année	Montant au début de l'année ($)	Intérêt accumulé ($)	Nouveau total à la fin de l'année ($)
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	100	10	110
7	210	21	231
8			
9			
10			
11			
12			
13			
14			
15			

Arrondis l'intérêt au dollar près pour chaque année.

Problem of the Week
Problem B and Solution
Interest-ing!

Problem

Monique and Tyrel were born on the same day. On the day they turned one year old, Monique's parents opened a savings account for her that earned 10% interest per year. Starting that day, Monique's parents put $100 in her account every year on her birthday, stopping just after she turned six. After that, the money remained in the account but Monique's parents did not put in any more money.

Tyrel's parents opened a similar savings account for him, however it wasn't until the day he turned six years old. Starting that day, his parents put $100 in his account each year on his birthday, earning 10% interest per year.

Complete the two given tables to find the total amount of money in Monique's and Tyrel's savings accounts. Who had the better saving strategy over 15 years?

For simplicity, round the interest to the nearest dollar for each year.

Solution

Examining the total amount of money put into the accounts, and the results in the tables on the following page, we make the following observations.

Monique's parents' put $100 into her account every year for 6 years, which is a total of $\$100 \times 6 = \$600$. At the end of 15 years, she had $2000 in her account, which means her account earned a total of $\$2000 - \$600 = \$1400$ in interest over 15 years.

Tyrel's parents put $100 into his account every year for 10 years, which is a total of $\$100 \times 10 = \$1000$. At the end of 15 years, he had $1752 in his account, which means his account earned a total of $\$1752 - \$1000 = \$752$ in interest over 10 years.

Clearly, Monique's parents had the better savings strategy. Even though her parents put only $600 into her account in the first 6 years, her account earned significantly more interest because the money was in the account for a longer period of time.

Monique

Year	Amount at Beginning of Year ($)	Interest Earned ($)	New Total at End of Year ($)
1	100	10	110
2	210	21	231
3	331	33	364
4	464	46	510
5	610	61	671
6	771	77	848
7	848	85	933
8	933	93	1026
9	1026	103	1129
10	1129	113	1242
11	1242	124	1366
12	1366	137	1503
13	1503	150	1653
14	1653	165	1818
15	1818	182	2000

Tyrel

Year	Amount at Beginning of Year ($)	Interest Earned ($)	New Total at End of Year ($)
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	100	10	110
7	210	21	231
8	331	33	364
9	464	46	510
10	610	61	671
11	771	77	848
12	948	95	1043
13	1143	114	1257
14	1357	136	1493
15	1593	159	1752

Problème de la semaine
Problème B
De façon ordonnée

a) Lorsqu'on écrit l'année 2021, nous écrivons deux nombres consécutifs à deux chiffres (20 et 21). Trouve toutes les autres années entre 1000 et 2021 qui sont composées de deux nombres consécutifs à deux chiffres et insère-les dans le tableau ci-dessous.

b) Détermine la somme des nombres consécutifs à deux chiffres pour chaque année de la partie a) et insère-les dans le tableau ci-dessous. Par exemple, pour 2021, la somme est $20 + 21 = 41$. Décris la régularité formée par ces sommes.

c) Détermine le produit des nombres consécutifs à deux chiffres pour les 5 premières années du tableau. Ensuite, calcule la différence, en ordre, entre les produits. Par exemple, $10 \times 11 = 110$ et $11 \times 12 = 132$. Leur différence est $132 - 110 = 22$.
Tu vas finir avec cinq produits et quatre différences.

(i) Quelle régularité est formée par ces différences?
(ii) Utilise cette régularité pour trouver les autres produits, sans multiplier.

d) Quelle suite peux-tu former en combinant les nombres de la colonne des sommes avec ceux de la colonne des différences?

Année	Somme	Produit	Différence
1011	$10 + 11 = 21$	$10 \times 11 = 110$	—
1112	$11 + 12 = 23$	$11 \times 12 = 132$	$132 - 110 = 22$
2021	$20 + 21 = 41$	$20 \times 21 = 420$	

Problem of the Week
Problem B and Solution
In an Orderly Fashion

Problem

a) When we write the year 2021, we are writing two consecutive two-digit numbers (20 and 21). Find all the other years from 1000 to 2021 that are made up of two consecutive two-digit numbers written in order, and add them to the table below.

b) Find the sum of the consecutive two-digit numbers for each year from part a), and add this to the table below. For example, for 2021, the sum is $20 + 21 = 41$. Describe the pattern formed by these sums.

c) Find the product of the consecutive two-digit numbers for each of the first 5 years in the table. Then find the differences of these products, in order. For example, $10 \times 11 = 110$ and $11 \times 12 = 132$. The difference is $132 - 110 = 22$. You will have five products and four differences.

(i) What pattern is formed by the differences?

(ii) Use this pattern to find the remaining products, without multiplying.

d) What sequence of numbers can you form by combining the numbers in the sum column and the difference column?

Year	Sum	Product	Difference
1011	$10 + 11 = 21$	$10 \times 11 = 110$	—
1112	$11 + 12 = 23$	$11 \times 12 = 132$	$132 - 110 = 22$
2021	$20 + 21 = 41$	$20 \times 21 = 420$	

Solution

(a) There are 11 years from 1000 to 2021 that are made up of consecutive two-digit numbers written in order. They are
1011, 1112, 1213, 1314, 1415, 1516, 1617, 1718, 1819, 1920, and 2021

(b) The table shows that each sum is 2 more than the previous sum.

(c) (i) Each difference is 2 more than the previous difference.
If you fill in the difference column, then you can use that to fill in the product column. For example, the difference of products for 1112 is 22. This means that the next difference will be 24. Adding $132 + 24 = 156$, which is the next product. The entire table can be completed this way.

(ii) The completed table is below.

Year	Sum	Product	Difference
1011	21	110	—
1112	23	132	22
1213	25	156	24
1314	27	182	26
1415	29	210	28
1516	31	240	30
1617	33	272	32
1718	35	306	34
1819	37	342	36
1920	39	380	38
2021	41	420	40

(d) If we combine the numbers in these 2 columns, we get the sequence of whole numbers from 21 to 41.

Problème de la semaine

Problème B

Qu'est-ce qu'on mange?

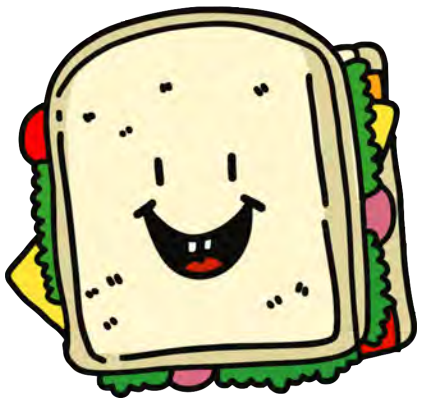
Sanji et les 34 élèves de sa classe apportent toujours des sandwichs à l'école pour dîner. Un jour, tout le monde a apporté soit un sandwich à la confiture, au jambon-fromage ou encore au thon.

Si le nombre d'élèves qui ont apporté un sandwich à la confiture (C) est le double du nombre d'élèves qui ont apporté un sandwich au jambon-fromage (J) et quatre fois le nombre d'élèves qui ont apporté un sandwich au thon (T), combien de sandwichs de chaque type y avait-il?

INDICE: Quel devrait être le total de sandwichs?

Le tableau ci-dessous pourrait t'aider avec une solution en utilisant la méthode d'essais et erreurs.

T	J	C	**Total**
1	?	4	?
2		8	



Problem of the Week
Problem B and Solution
What's for Lunch?

Problem

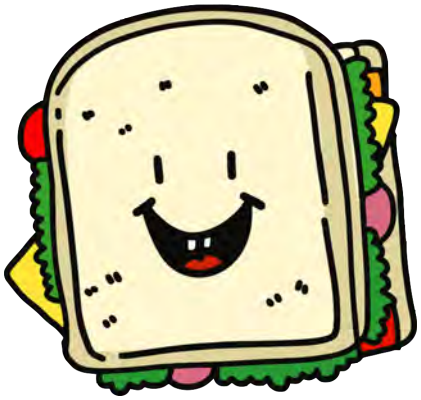
Sanji and his 34 classmates always bring sandwiches to school for lunch. One day, everyone brought either a jelly sandwich, or a ham and cheese sandwich, or a tuna salad sandwich.

If the number of students who brought jelly sandwiches (J) was twice the number who brought ham and cheese (H), and four times the number who brought tuna salad (T), how many sandwiches were there of each type?

HINT: What should the total number of sandwiches be?

You may find the table useful for the 'guess and check' method.

T	H	J	**Total**
1	2	4	7
2	4	8	14
3	6	12	21
4	8	16	28
5	10	20	35
6	12	24	42



Solution

Solution 1:

There are a total of $34 + 1 = 35$ students. Therefore, there must be 35 sandwiches. The completed table reveals that the only possible combination is 5 tuna salad, 10 ham and cheese, and 20 jelly sandwiches, in order to give the correct total number of 35 sandwiches.

Solution 2:

An alternate, algebraic solution is presented below. The algebra used in this solution may be beyond what students at this age have typically seen.

We are given that $J = 4 \times T$ and $J = 2 \times H$. This means that $H = 2 \times T$.
We now have

$$J + H + T = 4 \times T + 2 \times T + T = 7 \times T$$

But $J + H + T = 7 \times T$ is also equal to the total number of students.
Thus, $35 = 7 \times T$, which gives $T = 5$.
Since $T = 5$, we get $H = 2 \times 5 = 10$, and $J = 4 \times 5 = 20$.
Therefore, 5 students brought a tuna salad sandwich, 10 students brought a ham and cheese sandwich, and 20 students brought a jelly sandwich.

Problème de la semaine

Problème B

Des nombres à l'horizon

Le 3 juin 1989, le SkyDome (maintenant connu comme le Rogers Centre) a ouvert ses portes au public.

a) Les Blue Jays de Toronto ont joué leur premier match de la Série mondiale au SkyDome, le 20 octobre 1992. Combien de temps, en jours, s'est écoulé entre l'ouverture du SkyDome et ce match de baseball? N'oublie pas que 1992 était une année bissextile.

b) Le coût total de construction du SkyDome était de 570$ millions. Si la construction a officiellement commencé le 3 octobre 1986, en moyenne combien d'argent a été dépensé par mois entre la date de début de la construction et l'ouverture?

c) Si les entrepreneurs en construction s'attendaient à ce que le coût total de la construction (570$ millions) représente en moyenne 15$ millions par année durant la vie utile du SkyDome, combien d'années pensaient-ils que le SkyDome serait ouvert?

Problem of the Week
Problem B and Solution
Skyline Numbers

Problem

On June 3, 1989 the SkyDome (now known as the Rogers Centre) opened its doors to the public.

a) The Toronto Blue Jays played their first World Series game at the SkyDome on October 20, 1992. How many days was this after the opening of the SkyDome? Don't forget that 1992 was a leap year.

b) The overall cost of the SkyDome was \$570 million. If construction officially began on October 3, 1986, how much money was spent on average each month from the date construction began until its opening?

c) If the original builders were expecting the total cost of \$570 million to average to a cost of \$15 million per year over the lifetime of the SkyDome, for how many years did the original builders expect the SkyDome to last?

Solution

a) The number of days after June 3, 1989 until October 20, 1992 can be calculated in this way:

Time	Number of days
June 4, 1989 - June 3, 1991	$365 \times 2 = 730$
June 4, 1991 - June 3, 1992*	366
June 4, 1992 - June 30, 1992	27
July 1992	31
August 1992	31
September 1992	30
October 1, 1992 - October 20, 1992	20
Total	1235

*1992 was a leap year.

b) The period from October 3, 1986 to June 3, 1989 is equal to 2 years and 8 months. This is equivalent to $2 \times 12 + 8 = 32$ months.
Thus, the average cost per month is $\$570\,000\,000 \div 32 = \$17\,812\,500$ per month.

c) The number of years they were expecting the SkyDome to last is $570\,000\,000 \div 15\,000\,000 = 38$ years.

Problème de la semaine

Problème B

C'est relatif

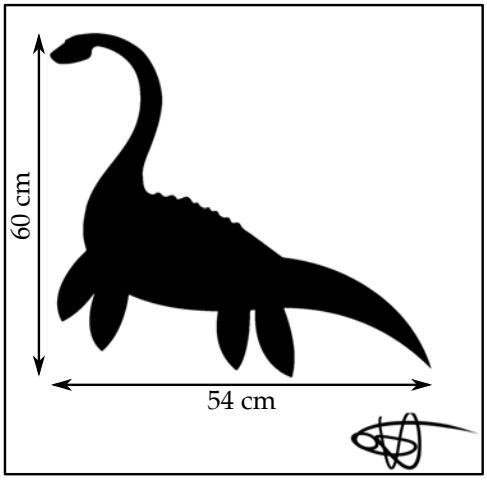
Jacob a une affiche d'un enderman, un personnage de Minecraft^{TM} et une affiche du monstre du Loch Ness sur son mur. Les dimensions de chaque affiche sont démontrées ci-dessous. Il souhaite créer un dessin plus petit, mais à l'échelle de chacun.

Jacob utilise une échelle de 1 : 6 pour dessiner son enderman. Il utilise une échelle différente pour dessiner le monstre du Loch Ness afin qu'il soit deux fois plus grand que le dessin de son enderman.

a) Quelle est la hauteur de son dessin du enderman?

b) Quelle échelle Jacob a-t-il utilisée pour dessiner le monstre du Loch Ness?

c) Quelle est la largeur du dessin du monstre du Loch Ness?



Problem of the Week
Problem B and Solution
It's All Relative

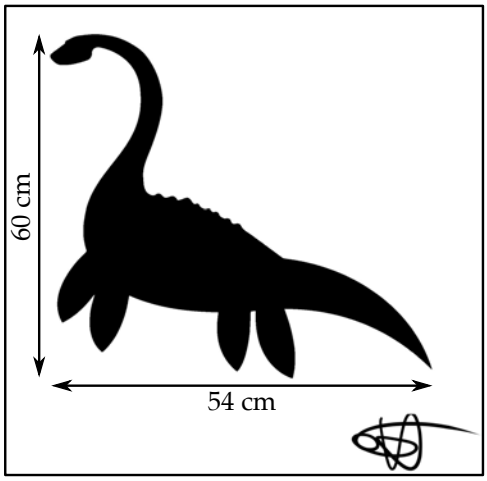
Problem

Jacob has a picture on his wall of an enderman Minecraft^{TM} character and another of the Loch Ness Monster. The dimensions of each are shown below. He wants to make a smaller scale drawing of each of them. Jacob uses a scale of $1 : 6$ to draw his enderman. He uses a different scale to draw the Loch Ness Monster so that it is twice as tall as his drawing of the enderman.

a) How tall is Jacob's drawing of the enderman?

b) What scale did Jacob use to draw the Loch Ness Monster?

c) How wide is Jacob's drawing of the Loch Ness Monster?



Solution

a) The original picture of the enderman is 90 cm tall, and Jacob is using a scale of $1 : 6$ to make his smaller drawing. Thus, Jacob's drawing is $90 \div 6 = 15$ cm tall.

b) Since Jacob's drawing of the Loch Ness Monster is twice as tall as his drawing of the enderman, that tells us his drawing of the Loch Ness Monster is $2 \times 15 = 30$ cm tall. The original picture of the Loch Ness Monster is 60 cm tall. So the scale is $30 : 60$, which is equivalent to $1 : 2$.

c) The original picture of the Loch Ness Monster is 54 cm wide, and Jacob is using a scale of $1 : 2$ to make his smaller drawing. Thus, Jacob's drawing is $54 \div 2 = 27$ cm wide.

Problème de la semaine

Problème B

Jesse fait du camping

Jesse planifie faire du camping et va acheter sa nourriture à trois magasins différents. À chaque magasin, elle paye avec un billet de 20$ et ne doit pas payer les taxes.

a) Sans utiliser une calculatrice, complète les tableaux suivants. Arrondis chaque total au 5 cents près avant de calculer le change.

Magasin 1	
Item	**Coût**
Pain	2,67$
Lait	4,47$
Beurre d'arachide	2,34$
Confiture	2,25$
Total	
Arrondis	
Change	

Magasin 2	
Item	**Coût**
Saucisses à hot-dog	5,00$
Pains à hotdog	2,39$
Ketchup	1,99$
Moutarde	1,09$
Relish	3,34$
Total	
Arrondis	
Change	

Magasin 3	
Item	**Coût**
Yogourt	2,67$
Mélange de noix	4,99$
Raisins	3,64$
Croustilles	3,65$
Total	
Arrondis	
Change	

b) Combien d'argent lui reste-t-il après avoir tout acheté?

c) Suppose que chaque magasin lui ait donné le plus petit nombre possible de billets et de pièces de monnaie comme change. Combien de billets et de pièces de monnaie de chaque type a-t-on donnés à Jesse?

billet de 10$: _____ pièce de 25 cents: _____

billet de 5$: _____ pièce de 10 cents: _____

pièce de 2$: _____ pièce de 5 cents: _____

pièce de 1$: _____

Problem of the Week
Problem B and Solution
Jesse Goes Camping

Problem

Jesse is going camping and is buying her food from three different stores. At each store she pays with a $20 bill, and is never charged tax.

a) Without using a calculator, complete the following charts. Round each total amount to the nearest 5 cents before calculating the change.

Store 1	
Item	**Cost**
Bread	$2.67
Milk	$4.47
Peanut Butter	$2.34
Jelly	$2.25
Total	$11.73
Rounded	$11.75
Change	$8.25

Store 2	
Item	**Cost**
Hotdogs	$5.00
Hotdog Buns	$2.39
Ketchup	$1.99
Mustard	$1.09
Relish	$3.34
Total	$13.81
Rounded	$13.80
Change	$6.20

Store 3	
Item	**Cost**
Yogurt	$2.67
Trail Mix	$4.99
Grapes	$3.64
Chips	$3.65
Total	$14.95
Rounded	$14.95
Change	$5.05

b) How much money does Jesse have left after buying everything?

c) Assuming she was given the fewest number of bills and coins possible for her change at each store, how many of each type of bill or coin was Jesse given?

Solution

a) The completed charts are shown above.

b) Jesse's total change is $\$8.25 + \$6.20 + \$5.05 = \$19.50$.

c) We need to calculate the number of each type of bill or coin Jesse received from each store.

- At Store 1, her change of \$8.25 is one \$5 bill, one \$2 coin, one \$1 coin, and one quarter.
- At Store 2, her change of \$6.20 is one \$5 bill, one \$1 coin, and two dimes.
- At Store 3, her change of \$5.05 is one \$5 bill, and one nickel.

Thus, in total, she would have the following:

\$10 bill:	0	25 cent coin (quarter):	1
\$5 bill:	3	10 cent coin (dime):	2
\$2 coin:	1	5 cent coin (nickel):	1
\$1 coin:	2		

Géométrie (G)

Problème de la semaine

Problème B

Les balles de foin du fermier Mac

Les balles de foin du fermier Mac sont en forme de prisme rectangulaire. Chaque balle de foin mesure 2 m de long sur 2 m de large sur 1,5 m de haut. Les balles de foin sont alignées dans un champ avec la face carrée sur le sol et les faces rectangulaires en vis-à-vis. Le fermier Mac laisse 50 cm d'espace entre les balles de foin.

a) Détermine la longueur d'une rangée de 20 balles de foin.
b) Quelle est l'aire totale, en m^2, du sol en-dessous de 20 balles de foin?

Problem of the Week
Problem B and Solution
Farmer Mac's Bales

Problem

Farmer Mac's hay bales are in the shape of rectangular prisms. Each hay bale is 2 m long by 2 m wide by 1.5 m high. The hay bales lie in rows in a field with one of the square sides of each hay bale on the ground and the rectangular sides of the hay bales facing each other. Farmer Mac leaves a 50 cm space between each hay bale.

a) Determine the length of row of 20 hay bales.

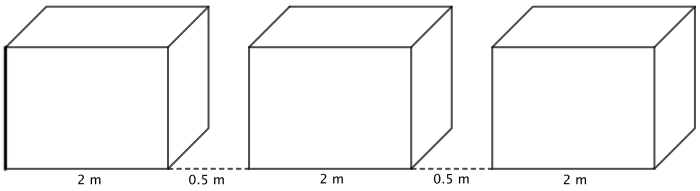
b) What is the total area, in m^2, of the ground underneath the 20 hay bales?

Solution

a) We will look at two ways to determine the length of a row of 20 hay bales.

The first way is by using a table.

The diagram below illustrates the first three bales, with 0.5 m between them (since 50 cm = 0.5 m).



The first bale is 2 m long, and each new bale after adds $2 + 0.5 = 2.5$ m to the length. We will show this in the following table.

bales	length
1	2
2	4.5
3	7
4	9.5
5	12
6	14.5
7	17
8	19.5
9	22
10	24.5

bales	length
11	27
12	29.5
13	32
14	34.5
15	37
16	39.5
17	42
18	44.5
19	47
20	49.5

Therefore, the length of a row with 20 hay bales is 49.5 m.

The second way we will find the length of a row with 20 bales is by setting up an algebraic expression.

If we let b represent the number of bales and s represent the number of spaces, then an algebraic expression for the length of a row of bales, in m, is

$$2 \times b + 0.5 \times s$$

Now, when there are 20 bales and 19 spaces the length becomes:

$$\begin{aligned} 2 \times 20 + 0.5 \times 19 &= 40 + 9.5 \\ &= 49.5 \end{aligned}$$

Therefore, the length of a row with 20 hay bales is 49.5 m.

b) The base of each hay bale is 2 m by 2 m.
So the area under each hay bale is $2 \times 2 = 4$ m^2.

There are 20 hay bales in the row, so the total area of the ground underneath the 20 hay bales is $20 \times 4 = 80$ m^2.

Problème de la semaine

Problème B

Tes dents, en prendre soin tu dois.

Certains dentistes suggèrent de se brosser les dents deux fois par jour pendant 2,5 minutes.

Pour ces problèmes, suppose que cette recommandation est respectée. Suppose aussi qu'il n'y a pas d'années bissextiles.

a) D'après cette recommandation, combien de secondes devrait-on passer à se brosser les dents par jour?

b) Combien d'heures passerais-tu à te brosser les dents dans une année?

c) Ces 25 dernières années, environ combien de jours ce joueur de hockey a-t-il passé à brosser les dents qu'il lui reste?

d) Maître Yoda avait environ 900 ans. Quotidiennement, ses dents il a brossé. Pendant combien de semaines aurait-il brossé ses dents durant sa vie?

LISTE DE CONVERSION DE TEMPS: (Tu peux rechercher ceux que tu ne connais pas déjà.)

_____ secondes = 1 minute
_____ heures = 1 jour
_____ jours = 1 semaine
_____ jours = 1 an
_____ semaine = 1 an

THÈMES GÉOMÉTRIE, SENS DU NOMBRE

Problem of the Week
Problem B and Solution
Your Teeth, You Must Care For

Problem

Some dentists recommend that you brush your teeth twice a day for 2.5 minutes each time. Assume for these problems that this recommendation has been followed. Also assume there are no leap years.

a) How many seconds per day of brushing are required by this recommendation?

b) About how many hours would you brush your teeth in a year?

c) Over the past 25 years, for about how many days would this hockey player have brushed what teeth he has?

d) Yoda was about 900 years old. Regularly, his teeth he did brush. For about how many weeks would he have brushed his teeth throughout his life?

Solution

a) It is recommend that you brush for 2.5 minutes twice per day, for a total of 5 minutes per day. The recommended number of seconds per day is
5 minutes per day $\times$ 60 seconds per minute $=$ 300 seconds per day.

b) The recommended number of minutes per year is
5 minutes per day $\times$ 365 days per year $=$ 1825 minutes per year.
This is equal to 30 hours and 25 minutes, or $30\frac{5}{12}$ hours $\approx$ 30.42 hours.
Alternatively, 5 minutes is equal to $\frac{1}{12}$ of an hour, giving
$\frac{1}{12}$ hours per day $\times$ 365 days $= \frac{365}{12}$ hours or $30\frac{5}{12}$ hours.

c) The number of hours of brushing in 25 years is equal to
$\frac{365}{12}$ hours per year$\times$ 25 years $= \frac{9125}{12}$ hours $= 760\frac{5}{12} \approx 760.42$ hours. This gives a total of $\frac{9125}{12}$ hours $\div$ 24 hours per day $\approx$ 31.7 days, slightly less than 32 days.

d) The number of hours of brushing in 900 years would be
$\frac{365}{12}$ hours per year $\times$ 900 years $= \frac{328\,500}{12} = 27\,375$ hours of brushing.
This gives 27 375 hours of brushing $\div$ 24 hours per day $=$ 1140.625 days of brushing.
This is equal to 1140.625 days of brushing $\div$ 7 days per week $\approx$ 162.95 or almost 163 weeks of brushing.

Problème de la semaine

Problème B

Fou des noix

Éric l'écureuil adore les noix. Il doit se préparer d'avance afin d'avoir assez de noix pour l'hiver, il décide donc de cacher des noix dans sa cour. Il les enterre d'une façon particulière afin de les retrouver facilement. Une partie de sa cour est démontrée dans la grille ci-dessous.

Pour cacher les noix, il utilise la stratégie suivante. En commençant au point X, il enterre 2 noix. Ensuite, il suivra les trois étapes suivantes.

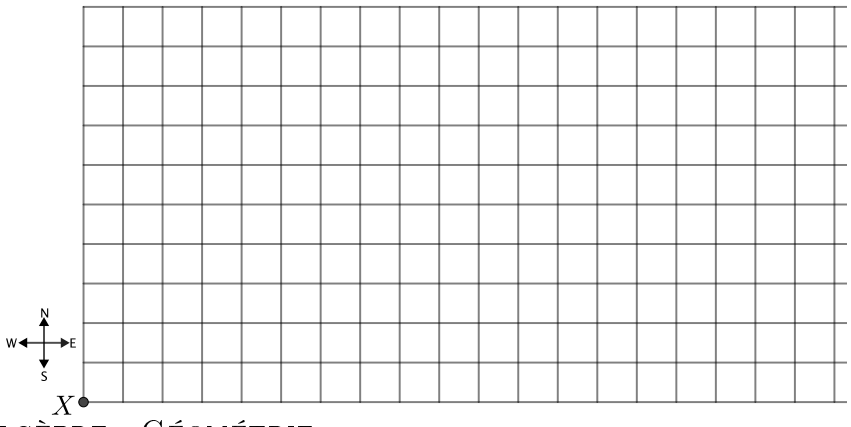
1. Il se déplace de 2 m vers le nord, 3 m vers l'est et 1 m vers le sud puis enterre 3 noix.
2. Il se déplace de 3 m vers le nord, 3 m vers l'est et 2 m vers le sud puis enterre 5 noix.
3. Il se déplace de 4 m vers le nord, 3 m vers l'est et 3 m vers le sud puis enterre 8 noix.

a) Sur la grille ci-dessous, identifie les positions des quatre premières cachettes d'Éric. Suppose que chaque ligne représente 1 m.

b) Suppose qu'Éric répète ces trois étapes à partir de la dernière place où il a caché des noix. Identifie les positions des trois prochaines cachettes.

c) Suppose qu'Éric répète ces trois étapes quatre autres fois. Utilise la régularité dans le nombre de noix enterrées pour déterminer combien de noix auront été cachées en tout.

VA PLUS LOIN: Réfère-toi aux points dans la grille de partie b). Décris comment Éric pourrait retrouver toutes ses cachettes en faisant le moins de pas possible.



THÈMES ALGÈBRE, GÉOMÉTRIE

Problem of the Week
Problem B and Solution
Squirrelly Over Nuts

Problem

Squiggles the Squirrel loves nuts. He has to be sure that he has enough for the winter, so he decides to hide a bunch around his yard. He buries them in a special way so that he will be able to find them. A portion of his yard is shown as a grid below.

In hiding the nuts, he uses the following plan. Starting at X he buries 2 nuts. He will then repeat the following three steps.

1. He moves 2 m north, 3 m east, and 1 m south, and then buries 3 nuts.
2. He moves 3 m north, 3 m east, and 2 m south, and then buries 5 nuts.
3. He moves 4 m north, 3 m east, and 3 m south, and then buries 8 nuts.

a) On the grid below, mark the positions of Squiggles' first four hiding spots. Assume each grid line measures 1 m.

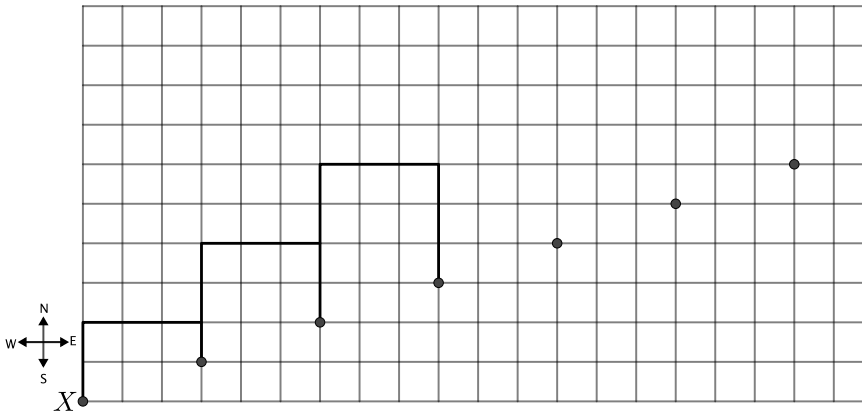
b) Suppose that Squiggles then repeats the three steps, starting from where he last buried nuts. Mark these next three hiding spots on your grid.

c) Suppose Squiggles repeats the three steps four more times. Use the pattern in the number of buried nuts to find how many nuts will he have hidden in total.

EXTENSION: Examine the points on your grid from part b). Describe how Squiggles could reach his hiding spots with the least amount of running around.

Solution

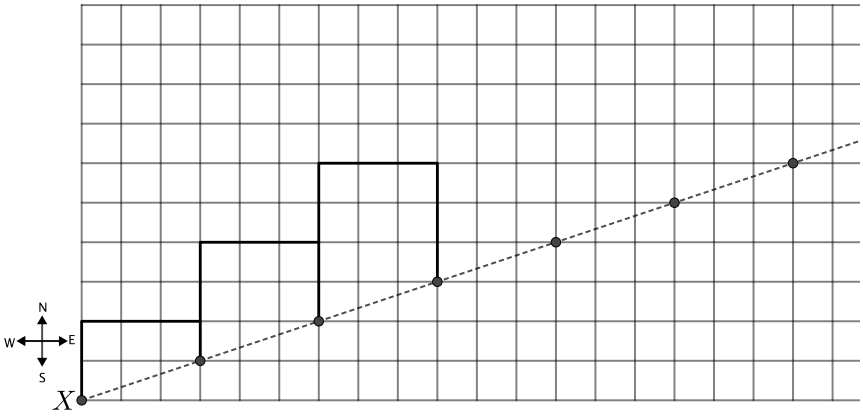
a),b) The grid below shows Squiggles' first four hiding spots with his path shown in bold lines, and the first repetition of steps 1, 2, and 3 of his plan.



c) During each repetition of steps 1, 2, and 3, Squiggles buries 3, then 5, then 8 nuts. Thus, with each repetition, he buries $3 + 5 + 8 = 16$ nuts. Since there are six repetitions in total, plus the 2 nuts he buried at X, he will have hidden a total of

$$6 \times 16 + 2 = 96 + 2 = 98 \text{ nuts}$$

EXTENSION: The grid below reveals that Squiggles' nuts are buried at points along the straight line (dotted) which, in effect, follows the pattern for every one square north it goes three squares east. Since the shortest distance between two points is along a straight line, he could save a lot of time and energy by just moving along this line and hiding his nuts at the appropriate points.
(But he's a squirrel, so he naturally likes to run about erratically!)



Problème de la semaine

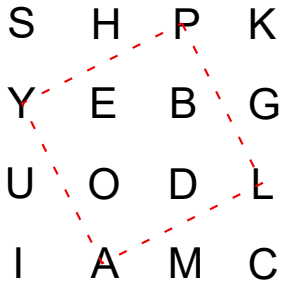
Problème B

Un jeu de mots

Dans le diagramme ci-dessous, on peut relier les lettres du mot anglais PLAY en traçant une ligne droite entre chaque paire de lettres consécutives du mot et une dernière ligne droite entre la dernière et la première lettre.

Lorsqu'on relie les lettres du mot PLAY, on voit que la forme qui est créée est un rectangle.

a) Lesquels des mots anglais suivants créeront aussi un rectangle lorsqu'on relie leurs lettres dans le diagramme?



SICK PLAY
SULK MODE
HACK DAUB

b) Nomme les formes créées en reliant les lettres des mots :
BEAM, BOYS, DAM.

VA PLUS LOIN: En reliant les lettres du diagramme, quels autres mots peux-tu trouver qui permettent de créer un polygone?

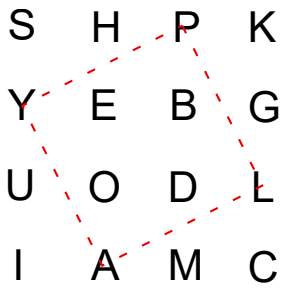
Problem of the Week
Problem B and Solution
Word Up!

Problem

In the diagram below, we can connect the letters of the word PLAY by drawing a straight line between each pair of consecutive letters in the word, and then another straight line from the last letter back to the first.

When we connect the letters of the word PLAY, we can see that the shape formed is a rectangle.

a) Which of the words shown below will also create a rectangle when we connect their letters in the diagram?



SICK PLAY
SULK MODE
HACK DAUB

b) Name the shapes formed when we connect the letters of these words:
BEAM, BOYS, DAM.

Challenge: What other words can you find which make polygons when you connect their letters in the diagram?

Solution

(a) SICK, SULK, HACK and PLAY form rectangles.
Note that SICK and PLAY form squares, but as a square is a type of rectangle, we include these.
Note also that though a square is a rectangle, a rectangle is not always a square.

(b) The shapes formed are: BEAM: rectangle
BOYS: quadrilateral
DAM: isosceles right-angled triangle

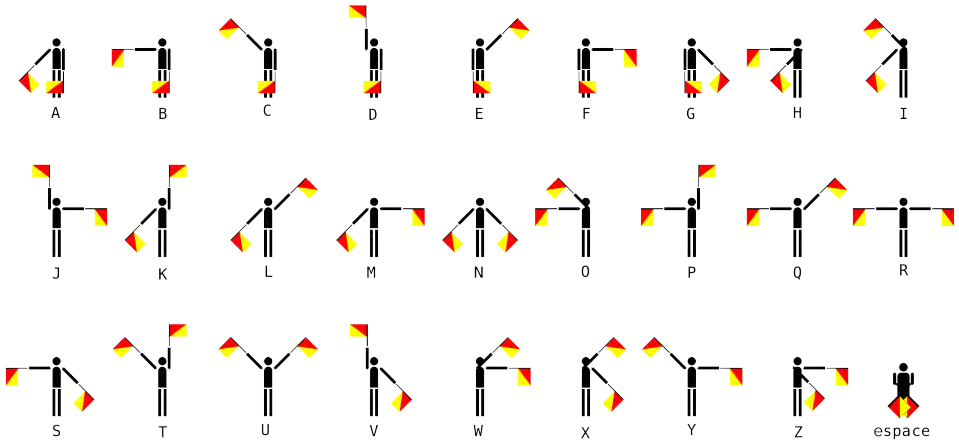
Challenge: Various words and polygons are possible, including:

YOU: isosceles right-angled triangle
MOB: isosceles right-angled triangle
BAM: right-angled triangle
CASH: quadrilateral
POD: right-angled triangle
MASH: parallelogram
POSH: isosceles triangle
GOAL: parallelogram

Problème de la semaine

Problème B

Drangles



Les drapeaux de signalisation de sémaphore sont un moyen de communication utilisé, entre autres, pour les avions. Chaque lettre de l'alphabet est représentée en plaçant les deux drapeaux dans des positions précises. Chaque drapeau peut être placé verticalement, horizontalement ou exactement à mi-chemin entre la verticale et l'horizontale.

a) Ajoute chaque lettre dans le tableau ci-dessous en les classant selon le type d'angle entre les deux drapeaux dans la représentation de la lettre. Les lettres A et L sont déjà placées. Le symbole pour 'espace' n'est pas une lettre. Il est seulement utilisé pour signaler les espaces entre les mots. Suppose que les angles sont tous compris entre 0° et 180°, inclusivement.

Type d'angle	Lettres
Aigu	A,
Droit	
Obtus	
Plat	L,

Voici comment nous savons que l'angle de la lettre A est aigu et que l'angle de la lettre L est plat:

Lettre A

Lettre L

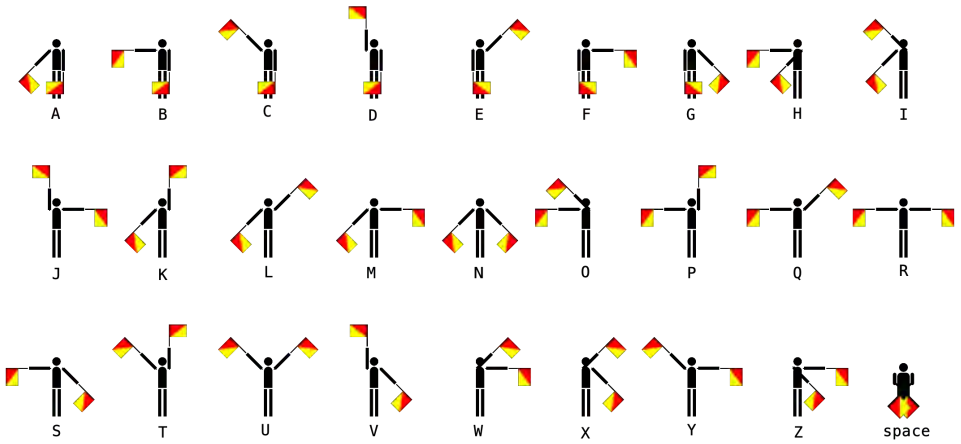
b) Lorsqu'on utilise les drapeaux de signalisation de sémaphore, seulement quatre mesures d'angles sont possibles entre les deux drapeaux. Quels sont ces angles? Suppose que les angles sont tous compris entre 0° et 180°, inclusivement.

c) Tente de communiquer un message simple à un ami en utilisant tes bras comme les drapeaux.

THÈME GÉOMÉTRIE

Problem of the Week
Problem B and Solution
Flangles

Problem



Semaphore signal flags are used to communicate in places such as on aircraft carriers. Each letter is represented by a specific position of the two flags. Each flag is placed vertically, horizontally, or exactly halfway between the vertical and the horizontal.

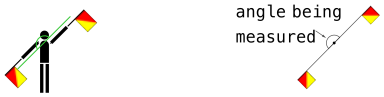
a) Add each letter to the table below by looking at the type of angle between the two flags in the signal for that letter. Letters A and L are already placed. The 'space' is not a letter. It is used to put a space between words. Assume the angles are between 0° and 180°, but can also include 0° and 180°.

Angle Type	Letters
Acute	A,
Right	
Obtuse	
Straight	L,

Here is how we know that the angle for letter A is acute and for letter L is straight:

Letter A

Letter L



b) When communicating with semaphore signal flags, there are only four different angle measurements between the two flags. What are these angles? Assume the angles are between 0° and 180°, but can also include 0° and 180°.

c) Try to communicate a simple message to a friend using your arms as semaphores.

Solution

a) The appropriate groups of letters are:

Angle Type	Letters
Acute	A, G, H, O, T, W, Z
Right	B, F, I, J, N, P, U, X
Obtuse	C, E, K, M, Q, S, V, Y
Straight	D, L, R

b) Since each acute angle is halfway between horizontal and the vertical, each one must measure $\frac{1}{2}$ of 90° which is 45°.
Also, each obtuse angle must measure $90^\circ + 45^\circ = 135^\circ$.
Therefore, the four angles in use are 45°, 90°, 135°, and 180°.

Problème de la semaine

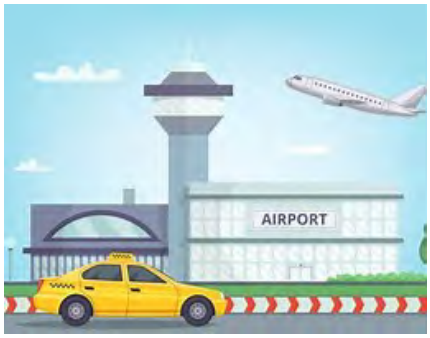
Problème B

Un bon coup à bon coût

Trois frères, Andy, Bob et Curly prennent un taxi ensemble pour se rendre de l'aéroport à leurs maisons.

Leurs maisons se situent sur le même trajet.

— La maison d'Andy est à 21 km de l'aéroport,
— la maison de Bob est à 42 km de l'aéroport et
— la maison de Curly est à 63 km de l'aéroport.



Si le coût du taxi est de 2,00$ par km, tente de trouver au moins deux façons différentes de séparer le coût du trajet entre les trois passagers (sans considérer le pourboire), en t'assurant que ce soit juste.

Problem of the Week
Problem B and Solution
Fare's Fair!

Problem

Three brothers, Andy, Bob, and Curly, take a taxi together home from the airport.

Their homes lie along the same route;

- Andy's is 21 km from the airport,
- Bob's is 42 km, and
- Curly's is 63 km.

If the taxi fare is \$2.00 per km, try to find at least two possible fair ways for each of the three travellers to pay the driver (not including the tip)?

Solution

The total cost is \$2 per km $\times$ 63 km = \$126. Here are three possible ways to pay the driver.

Solution 1:
If each passenger pays $\frac{1}{3}$ of the total cost, then they each pay \$126 $\div$ 3 = \$42.

Solution 2:
Three passengers travel the first $\frac{1}{3}$ of the trip (21 km) for \$42, so each pays \$42 $\div$ 3 = \$14 for that portion of the trip. So Andy pays \$14.
Two passengers travel the next 21 km for \$42, so each pays \$42 $\div$ 2 = \$21 each for that portion of the trip plus \$14 for the first portion of the trip. So Bob pays \$21 + \$14 = \$35.
Only one passenger, Curly, travels the final 21 km for \$42. So Curly pays \$14 + \$21 + \$42 = \$77 for all three portions of the trip.
Notice the total paid is \$14 + \$35 + \$77 = \$126.

Solution 3:
A third possibility is that they each pay according to their distance travelled. Andy travels 21 km, Bob travels 42 km, and Curly travels 63 km, a total of 21 + 42 + 63 = 126 km. Thus it would cost \$126 $\div$ 126 km = \$1.00 per km per person. So Andy pays \$21, Bob pays \$42, and Curly pays \$63.

Problème de la semaine

Problème B

Les livres d'Aisha

Aisha passe la semaine au chalet et aimerait lire son livre préféré qui a 400 pages.

a) Si elle lit une page en 36 secondes, combien d'heures lui faudra-t-il pour lire son livre?

b) Suppose qu'Aisha lit seulement entre 10h15 et 14h10 et ensuite entre 19h20 et 21h00 à tous les jours, en commençant par lundi. Quel jour et à quelle heure aura-t-elle terminé son livre?

c) Aisha décide de lire un deuxième livre de 350 pages et commence à en faire la lecture immédiatement après avoir terminé son premier livre. Si elle continue à lire au même rythme, quand aura-t-elle terminé le deuxième livre?

Problem of the Week
Problem B and Solution
Aisha's Books

Problem

Aisha is spending a week at her family's cottage and wants to read her favourite book, which is 400 pages long.

a) If she reads one page every 36 seconds, how many hours will it take her to read her book?

b) Suppose Aisha only reads from 10:15 a.m. to 2:10 p.m., and from 7:20 p.m. to 9:00 p.m. each day, starting on Monday. On what day and at what time will she finish reading her book?

c) Aisha decides to read a second book that is 350 pages in length, starting right after finishing her first book. If she continues to read at the same speed, then when will she finish her second book?

Solution

a) At a rate of one page every 36 seconds, 400 pages will take Aisha $400 \times 36 = 14\,400$ seconds, or $14\,400 \div 60 = 240$ minutes or $240 \div 60 = 4$ hours to read.
Note: Another way to solve this problem is to notice that since there are 60 seconds in a minute and 60 minutes in hour, there are $60 \times 60 = 3600$ seconds in an hour. We could then find the number of hours by calculating 14 400 seconds $\div$ 3600 seconds per hour, which equals 4 hours.

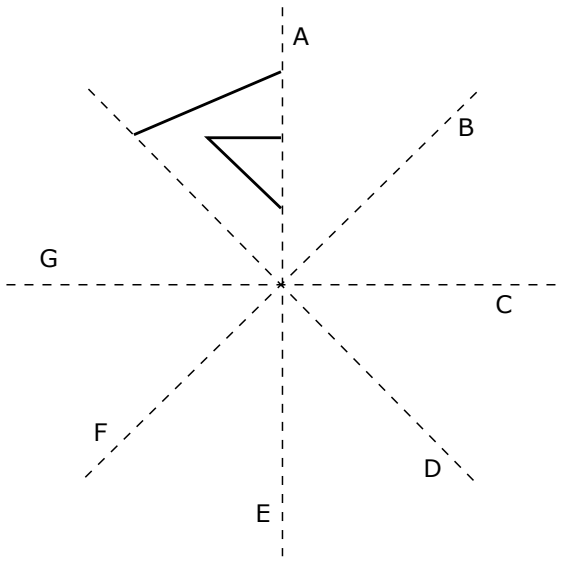
b) The number of hours between 10:15 a.m. and 2:10 p.m. is 3 hours (from 10:15 to 1:15), plus 55 minutes (from 1:15 to 2:10). Thus Aisha will need another 5 minutes to finish the book. Therefore, she will finish at 7:25 p.m. on Monday. This is five minutes after she starts again at 7:20 p.m.

c) The second book will take Aisha $350 \times 36 = 12\,600$ seconds, which is equal to $12\,600 \div 60 = 210$ minutes, or 3 hours and 30 minutes.
Since she will start reading at 7:25 p.m. on Monday, Aisha will have 1 hour and 35 minutes, or 95 minutes, to read between 7:25 and 9:00 p.m. on Monday.
Aisha will need another $210 - 95 = 115$ minutes, or 1 hour and 55 minutes, to finish her second book.
Starting at 10:15 a.m. on Tuesday and reading for 1 hour and 55 minutes will take her until 12:10 p.m. So she will be done her second book at 12:10 p.m. on Tuesday.

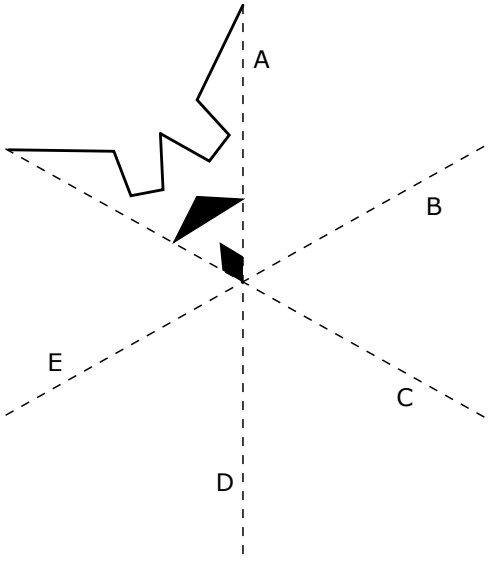
Problème de la semaine
Problème B
Réfléchir à son dessin

Dans les questions a) et b), nous allons effectuer plusieurs réflexions. Lorsque tu auras terminé les réflexions, tu devrais obtenir une image agréable à regarder.

a) Dans l'illustration de droite, les lignes continues représentent le motif de départ. Les lignes pointillées représentent des miroirs qui serviront à réfléchir les images. En premier, effectue une réflexion des lignes continues à partir du miroir A pour créer de nouvelles lignes continues entre les miroirs A et B. Ensuite, effectue une réflexion des nouvelles lignes à partir du miroir B pour créer des lignes continues entre les miroirs B et C. Répète ce processus afin de compléter le dessin en réfléchissant les nouvelles lignes à partir des miroirs C, D, E, F, et G.



b) Le motif de départ pour la deuxième image est démontré dans l'illustration de gauche. Les lignes pointillées représentent des miroirs qui serviront à réfléchir les images. En premier, effectue une réflexion du motif à partir du miroir A pour créer un nouveau motif entre les miroirs A et B. Ensuite, effectue une réflexion des nouvelles lignes à partir du miroir B pour créer un motif entre les miroirs B et C. Répète ce processus afin de compléter le dessin en réfléchissant les nouveaux motifs à partir des miroirs C, D, et E.



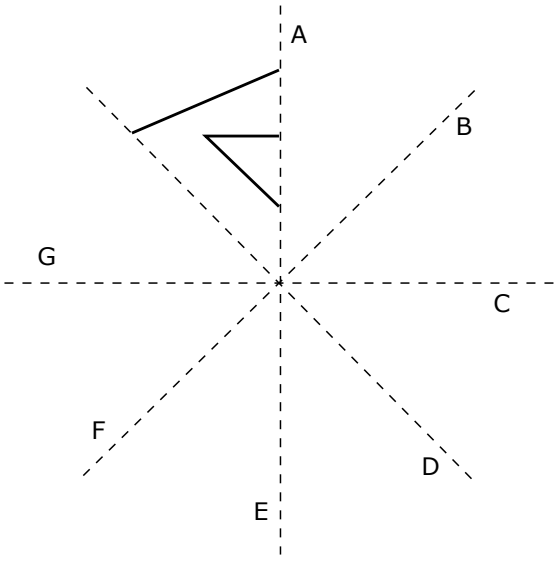
c) Décris les stratégies que tu as utilisées pour compléter ton image à un camarade de classe.

Problem of the Week
Problem B and Solution
Reflecting on Your Design

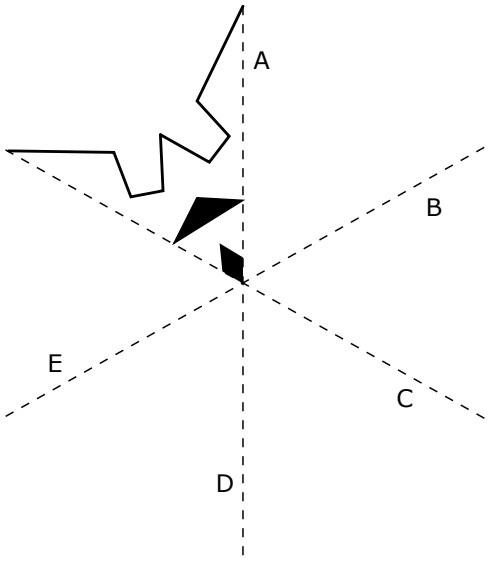
Problem

In parts a) and b), we are going to be performing a number of reflections. When you are finished all the reflections, you should have an overall pattern that is pleasing to the eye.

a) The solid lines on the right show the start of a pattern. The dotted lines represent mirrors that will reflect an image. First, reflect the solid lines across mirror A to create new solid lines between mirrors A and B. Then reflect the new solid lines across mirror B to create new solid lines between mirrors B and C. Continue in this way to finish the design, and reflect the new lines of the pattern across mirrors C, D, E, F, and then G.



b) The start of a second pattern is shown on the right. The dotted lines represent mirrors that will reflect an image. First, reflect the pattern across mirror A to create a new pattern between mirrors A and B. Then reflect the new pattern across mirror B to create a new pattern between mirrors B and C. Continue in this way to finish the design, and reflect the new pattern across mirrors C, D and then E.

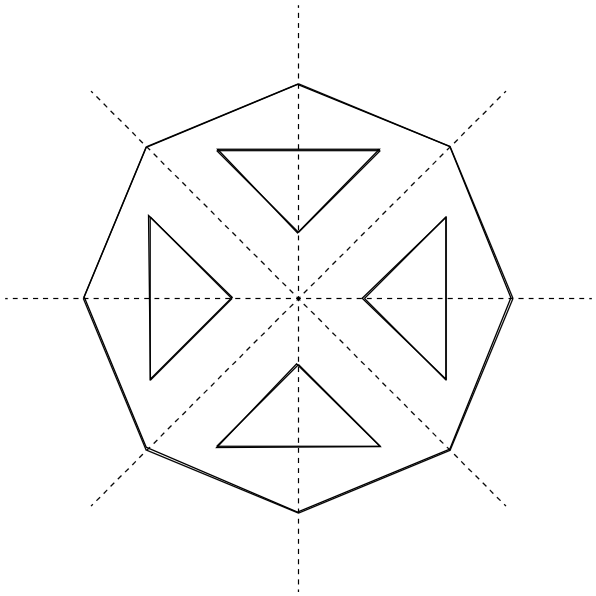


c) Describe to a classmate the process you used to complete your design accurately.

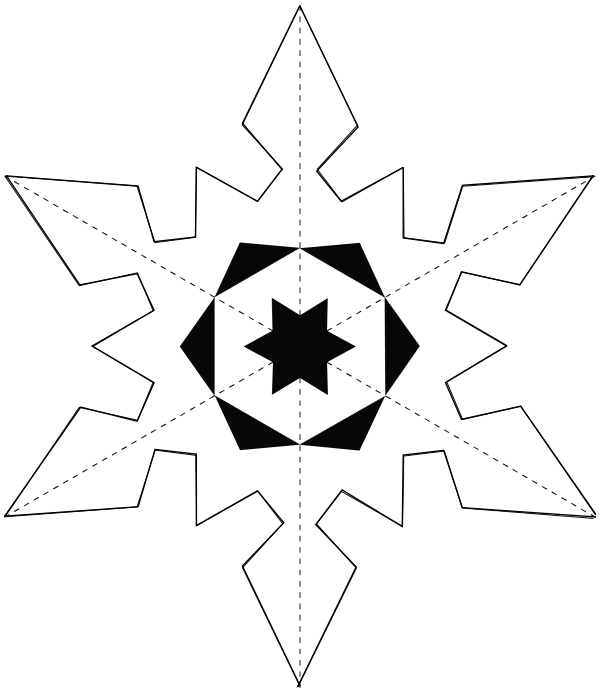
Solution

The completed diagrams are shown on the next page.

a)



b)

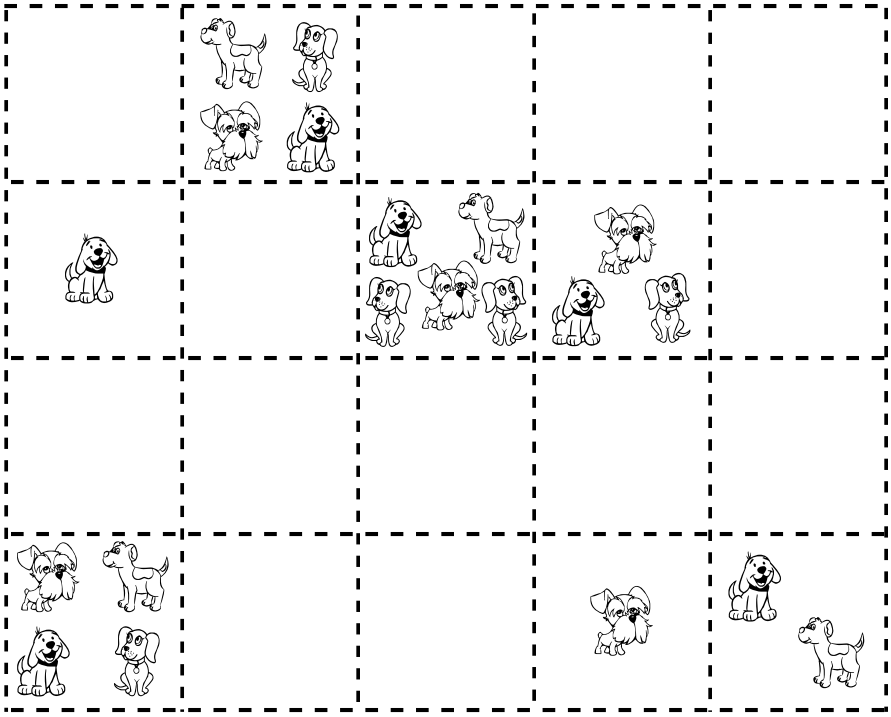


c) Here are some strategies you might have used.

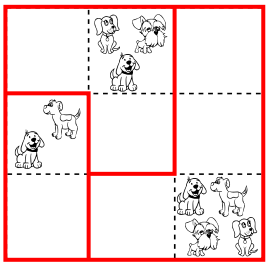
- Use a MIRA or some other optical drawing instrument to 'reflect' across the dotted lines.
- Fold the paper along the dotted line, trace the solid lines onto the back of the next section, and then open the paper up and trace the solid lines through the paper so they are on the front.
- Mark key points on the pattern, such as the vertices of any closed shape or where a line changes direction. Then measure the horizontal or vertical distance from each key point to the dotted line. Use these distances to draw the key points in the next section, and then complete the pattern using the key points.

Problème de la semaine
Problème B
Des grilles chaotiques

La grille suivante est composée de quatre rangées, chacune possédant 5 cases qui mesurent 1 par 1. Sept cases contiennent des groupes de chiens. Ces chiens jouent bien avec les autres chiens dans leur groupe, mais ne jouent pas bien avec les chiens des autres groupes. Tu veux séparer les groupes de chiens en construisant des clôtures le long des lignes pointillées.



a) Trouve deux façons de construire les clôtures pour séparer la grille en sept régions distinctes, afin de t'assurer que chaque région a le même nombre de cases 1 par 1 que de chiens.
Voici un exemple d'une grille 3 par 3, séparée en trois régions distinctes.



b) Partage tes solutions avec tes camarades de classe. Leurs solutions sont-elles différentes des tiennes?

c) Place les sept groupes de chiens dans différentes cases de la grille et répète la partie a). Y a-t-il des arrangements pour lesquels il n'existe AUCUNE solution?

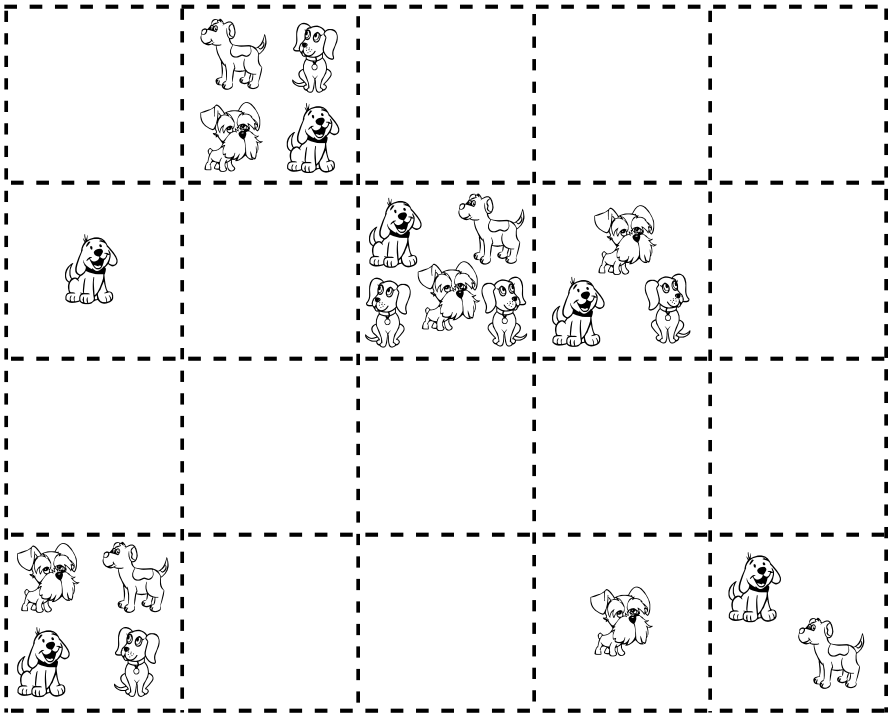
Si tu n'imprimes pas cette page, tu peux faire le travail à partir de notre grille interactive.

Thèmes Pensée computationnelle, Géométrie

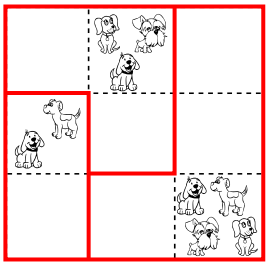
Problem of the Week
Problem B and Solution
Crazy Grids

Problem

The grid below consists of four rows, each with five 1 by 1 squares. Seven of these squares contain groups of dogs. These dogs play nicely with other dogs in their own group, but do not play well with the dogs in other groups. You would like to separate the groups of dogs by putting up fences along some of the dashed gridlines.



a) Find two ways to put up fences that would divide the grid into seven distinct regions, so that each region contains the same number of 1 by 1 squares as dogs.
An example of a different 3 by 3 grid divided into three such regions is shown to the right.



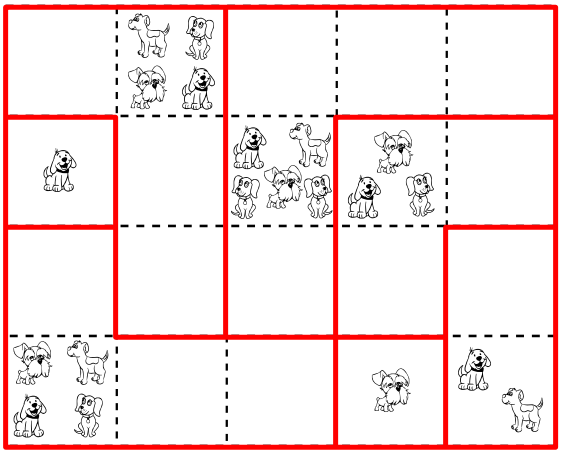
b) Share your solutions with your classmates. Did they find solutions different from yours?

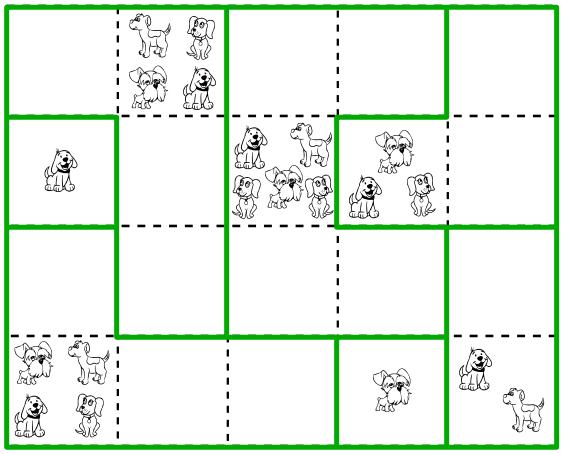
c) Move the seven groups of dogs to different squares in the grid, and repeat part a) using your new grid. Did you find any arrangements for which there was NO solution?

Not printing this page? You can divide the grid on our interactive worksheet.

Solution

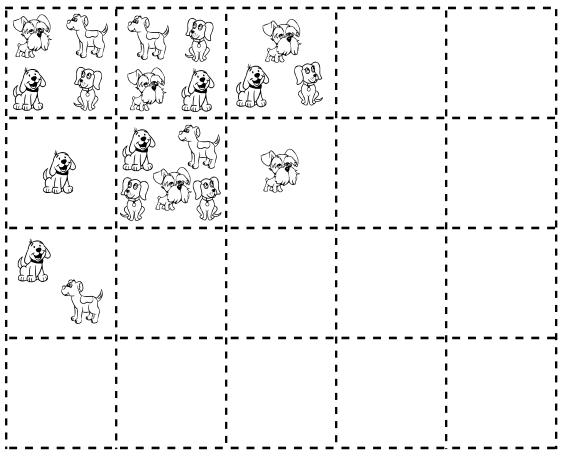
a) Two different solutions are shown below.





b) There are six solutions in total. See if you can find them all!

c) There are many ways to place the dogs. One arrangement for which there is NO solution is to place all seven squares with dogs clustered together in one corner of the grid, like in the grid below.



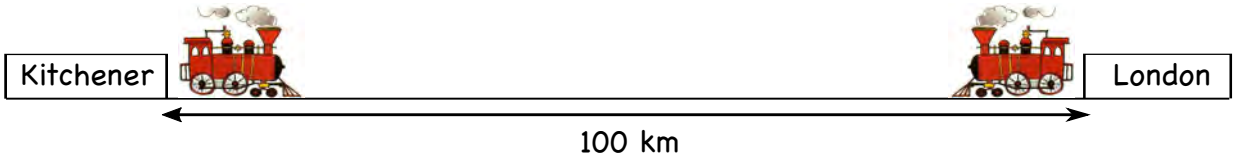
Since there are seven groups of dogs and we want to divide the grid into seven distinct regions, each group of dogs except the single dogs needs adjacent empty squares in order for a solution to exist. When all the dogs are clustered together like this, there aren't enough adjacent empty squares, so it is not possible to find a solution.

Problème de la semaine

Problème B

Midi pile, deux trains et une abeille

Les gares de Kitchener et de London sont à 100 km l'une de l'autre, le long d'une section droite de voie ferrée. Un train quitte la gare de Kitchener à midi et se dirige vers London. Un train différent quitte la gare de London à midi, utilise une voie ferrée parallèle à celle du premier train et se dirige vers Kitchener.



a) Le train de Kitchener voyage à une vitesse de 60 km par heure. Quelle est sa vitesse en km par minute?

b) Le train de London se déplace à une vitesse de 90 km par heure. Quelle est sa vitesse en km par minute?

c) Détermine l'heure à laquelle les trains vont commencer à se croiser. Pour se faire, il serait pourrait être utile de remplir le tableau ci-dessous.

Temps (en minutes à partir de midi)	Distance parcourue par le train de Kitchener	Distance parcourue par le train de London	Distance totale parcourue par les deux trains
10			
20			
30			
40			
50			
60			

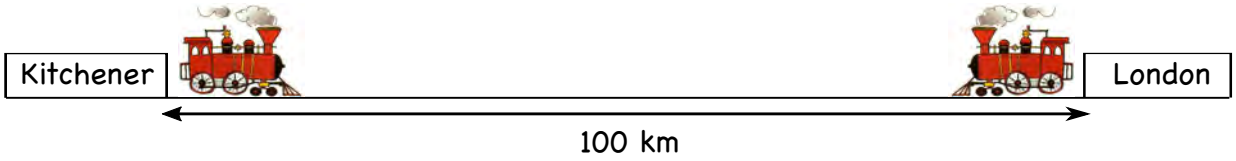
VA PLUS LOIN: Bert, l'abeille magique, vole aller-retour entre les deux trains à une vitesse de 120 km par heure pendant que les trains se rapprochent l'un de l'autre. Quelle est la distance totale parcourue par l'abeille jusqu'au moment où les trains commencent à se croiser?
(Note: Bert ne perdra pas de temps en changeant de direction.)

THÈMES ALGÈBRE, GÉOMÉTRIE

Problem of the Week
Problem B and Solution
High Noon, Two Trains, and a Bee

Problem

The Kitchener and London train stations are 100 km apart on a straight section of railroad. A train leaves Kitchener Station at noon, and travels toward London Station. A different train leaves London Station at noon, and travels toward Kitchener Station on a parallel track.



a) The train from Kitchener is travelling at 60 km per hour. What is its speed in km per minutes?

b) The train from London is travelling at 90 km per hour. What is its speed in km per minutes?

c) Find the time that the trains begin to pass each other. To do so, you may find completing the table below helpful.

Time (in minutes after noon)	Distance travelled by the train leaving Kitchener	Distance travelled by the train leaving London	Total distance travelled by the two trains
10	10	15	25
20	20	30	50
30	30	45	75
40	40	60	***100***
50	50	75	125
60	60	90	150

EXTENSION: Bert the magical bee flies at 120 km per hour back and forth between the two trains as they travel towards one another. What is the total distance he has travelled just as the trains begin to pass one another?
(Note: Bert will not lose any time as he changes direction.)

Solution

a) The train from Kitchener has a speed of
$60 \text{ km/hour} = \dfrac{60 \text{ km}}{60 \text{ min}} = 1 \text{ km/min}.$

b) The train from London has a speed of $\dfrac{90 \text{ km}}{60 \text{ min}} = 1.5 \text{ km/min}.$

c) The train from Kitchener has a speed of 1 km/min. Thus in 10 minutes, it will travel 10 km.
The train from London has a speed of 1.5 km/min. Thus in 10 minutes, it will travel 15 km.
We can now fill in the table. This is done on the previous page.
The two trains will begin to pass each other when the total distance travelled is equal to the distance between the two stations. The table values reveal that this occurs 40 minutes after noon.
Therefore, the trains begin to pass each other at 12:40 pm.

EXTENSION:
Magical Bert flies at 120 km/hr, or $\dfrac{120 \text{ km}}{60 \text{ min}} = 2 \text{ km/min}$, or 20 km in 10 minutes. Since the trains begin to pass one another after 40 minutes, Bert is flying back and forth between the trains for 40 minutes. Thus after 40 minutes, he will have flown $20 \text{ km} \times 4 = 80 \text{ km}$ in total.

Problème de la semaine

Problème B

Il manque quelque chose

Les figures dans le diagramme ci-dessous sont semblables. Elles contiennent chacune un cercle ainsi que des lignes droites.

a) Suppose qu'on crée de nouvelles figures en enlevant toutes les lignes droites qui sont situées à l'extérieur du cercle de 75% des figures.

   (i) Montre par un dessin à quoi ressemble une des nouvelles figures.

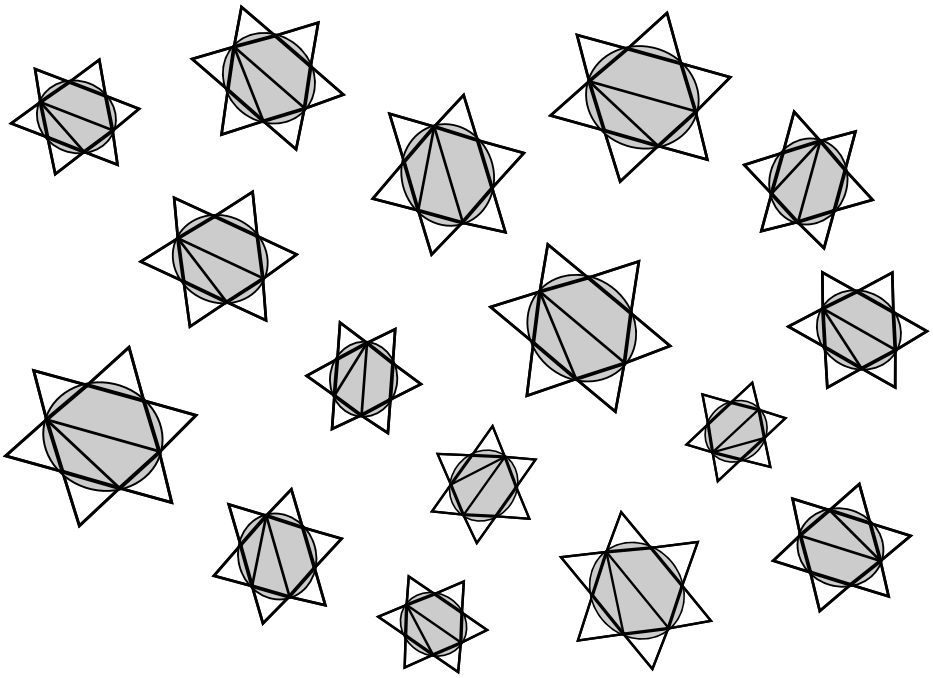
   (ii) Combien de nouvelles figures sont créées?

   (iii) Combien de figures demeurent inchangées?

b) Suppose maintenant qu'on enlève le cercle du $\frac{2}{3}$ des nouvelles figures créées dans la partie a).

   (i) Combien de nouvelles figures de la partie a) possèderont encore un cercle?

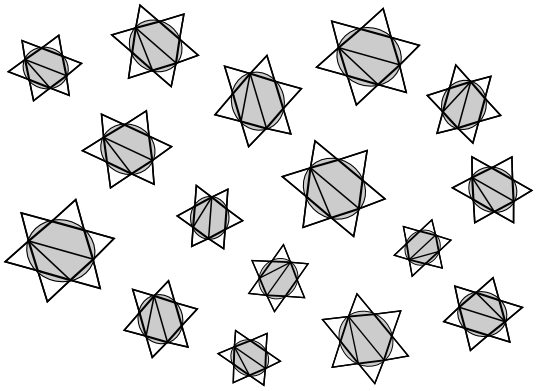
   (ii) Montre par un dessin à quoi ressemble une des nouvelles figures sans le cercle. Ensuite, nomme toutes les figures formées par les lignes droites de cette figure.



Problem of the Week
Problem B and Solution
Something's Missing...

Problem

The figures in the diagram below are similar. They each contain a circle and some straight lines.



a) Suppose new figures are created by removing all straight lines which lie outside the circle from 75% of the figures.

   (i) Draw a diagram showing what one of the new figures would look like.

   (ii) How many new figures are created?

   (iii) How many of the original figures remain unchanged?

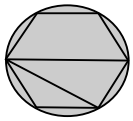
b) Now suppose that the circle is removed from $\frac{2}{3}$ of the new figures created in part a).

   (i) How many of the new figures from part a) will still contain a circle?

   (ii) Draw a diagram of one of the new figures with the circle removed. Then name all the geometric shapes formed by the straight lines in this figure.

Solution

a) (i) A typical new figure would look like this:

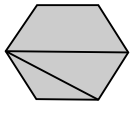


(ii) There are 16 figures in total. Since $75\% = \frac{75}{100} = \frac{3}{4} = \frac{12}{16}$, that tells us 12 new figures were created.

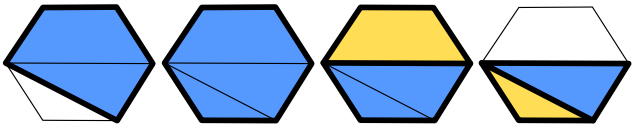
(iii) There are 16 figures in total and 12 of them were changed. So $16 - 12 = 4$ of the original figures remain unchanged.

b) (i) There were 12 new figures created in part a). Since $\frac{2}{3} = \frac{8}{12}$, that tells us 8 of the figures have no circle, so $12 - 8 = 4$ will still have a circle.

(ii) A typical new figure would look like this:



It contains a pentagon, a hexagon, two trapezoids, and two triangles, as shown below.



Problème de la semaine

Problème B

En forme

Détermine l'aire des quatre figures ci-dessous. Afin de trouver l'aire, tu devras peut-être décomposer chaque figure d'une façon qui te sera utile.

NOTE: Chaque mesure est donnée en cm. La figure 1 possède une ligne verticale de symétrie, la figure 2 a une ligne horizontale de symétrie et la figure 3 a deux lignes de symétrie, dont une verticale et une horizontale. Tous les angles de la figure 3 sont des angles droits.

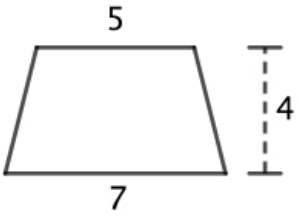


Figure 1

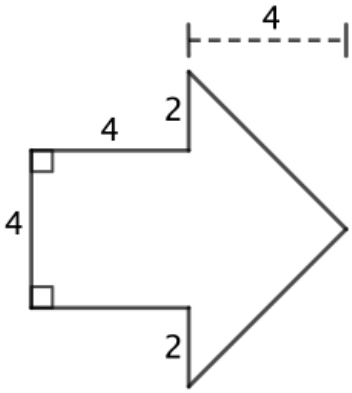


Figure 2

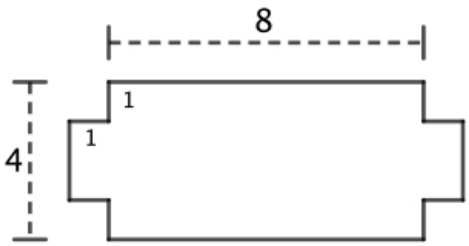


Figure 3

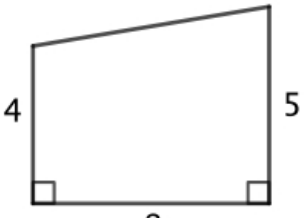


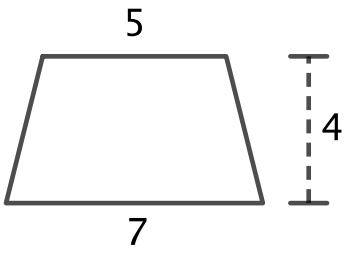
Figure 4

Problem of the Week
Problem B and Solution
Shape Up

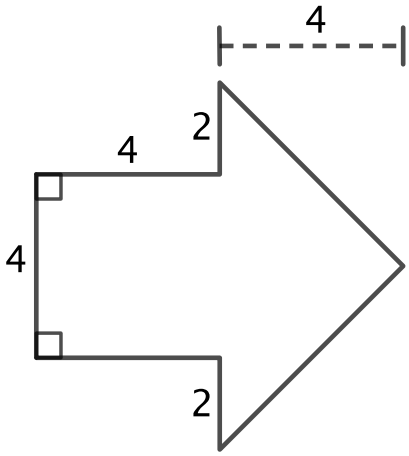
Problem

Determine the area of each of the four shapes below. In order to find the area, you may divide each shape up into other shapes in any way you need to.

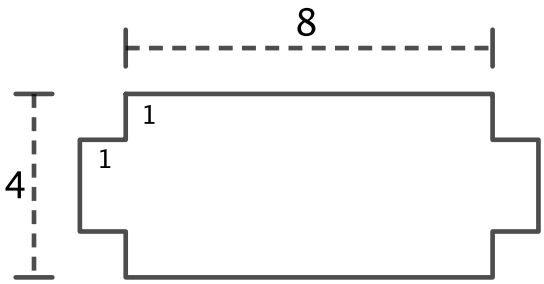
NOTE: All linear measures are in cm. Shape 1 has a vertical line of symmetry, Shape 2 has a horizontal line of symmetry, and Shape 3 has both a horizontal and a vertical line of symmetry. All angles in Shape 3 are right angles.



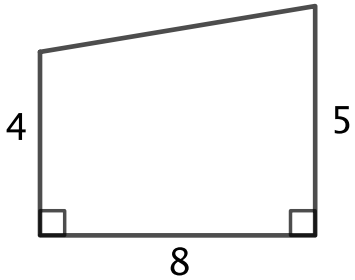
Shape 1



Shape 2



Shape 3

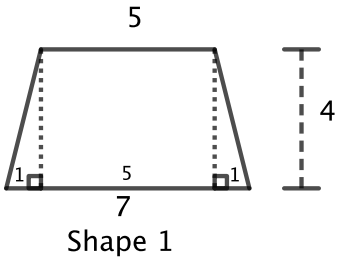


Shape 4

Solution

Shape 1:

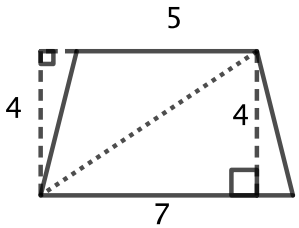
Solution 1: Divide the shape into two right-angled triangles and a rectangle, as shown to the right.
Since there a vertical line of symmetry, the base of each triangle is $\frac{7-5}{2} = 1$. So each triangle has area $\frac{1\times 4}{2} = 2$.
The rectangle has dimensions 5 by 4, and so its area is $5 \times 4 = 20$.



Shape 1

Therefore, the area of Shape 1 is $2 + 2 + 20 = 24$ cm^2.

Solution 2: Divide the shape into two triangles, as shown to the right.
The bottom triangle has a base of 7 and a height of 4, so the area of this triangle is $\frac{7\times 4}{2} = 14$.
The top triangle has a base of 5 and a height of 4. (You may have to turn the page upside down to see this.) So the area of this triangle is $\frac{5\times 4}{2} = 10$.

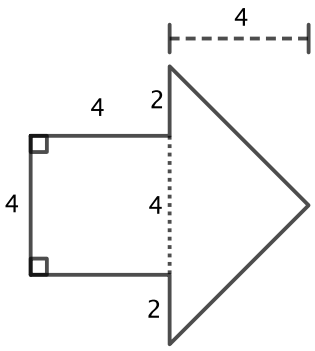


Shape 1

Therefore, the area of Shape 1 is $14 + 10 = 24$ cm^2.

Shape 2:

Divide the shape into a square and a triangle, as shown to the right.
The square has a side length of 4, so the area of the square is $4 \times 4 = 16$.
The triangle has base $2 + 4 + 2 = 8$ and height 4, so the area of the triangle is $\frac{8\times 4}{2} = 16$.

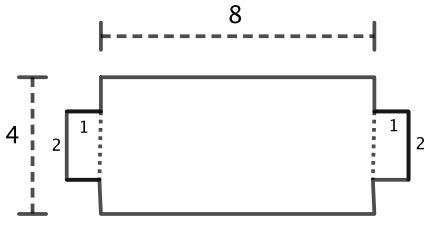


Shape 2

Therefore, the area of Shape 2 is $16 + 16 = 32$ cm^2.

Shape 3:

Solution 1: Divide the shape into three rectangles, vertically, as shown to the right.
Each side rectangle has length $4-1-1 = 2$ and width 1, so the area of each side rectangle is $2 \times 1 = 2$.
The middle rectangle has the dimensions of 8 by 4, so its area is $8 \times 4 = 32$.

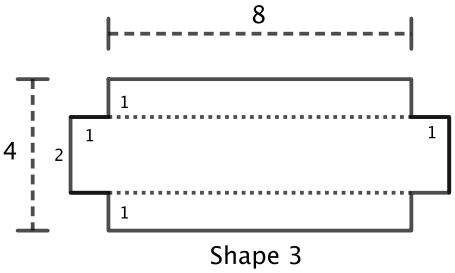


Shape 3

Therefore, the area of Shape 3 is $2+2+32 = 36$ cm^2.

Solution 2: Divide the shape into three rectangles, horizontally, as shown to the right.
The top and bottom rectangles have the dimensions of 1 by 8, so the area of each is $1 \times 8 = 8$.
The length of the middle rectangle is $8 + 1 + 1 = 10$ and its width is $4 - 1 - 1 = 2$, so the middle rectangle has area $10 \times 2 = 20$.

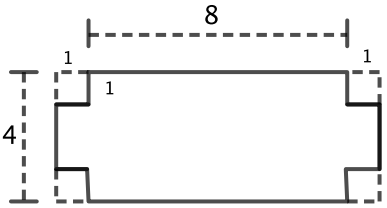
Therefore, the area of Shape 3 is $8 + 8 + 20 = 36$ cm^2.



Shape 3

Solution 3: Divide the shape into one rectangle with four 1 by 1 corners removed, as shown to the right.
The large rectangle has a length $8 + 1 + 1 = 10$ and width is 4, so its area is $10 \times 4 = 40$. Each of the corner squares has dimensions of 1 by 1, so area $1 \times 1 = 1$.

Therefore, the area of Shape 3 is $40 - 4 \times 1 = 36$ cm^2.

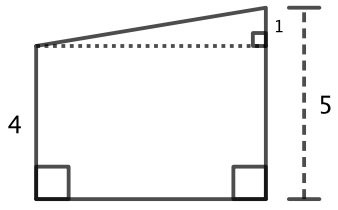


Shape 3

Shape 4:

Solution 1: Divide the shape into a rectangle and a triangle, as shown to the right.
The base of the triangle is 8 and the height is $5 - 4 = 1$, so the area of the triangle is $\frac{8 \times 1}{2} = 4$.
The rectangle has the dimensions 4 by 8, so area $4 \times 8 = 32$.

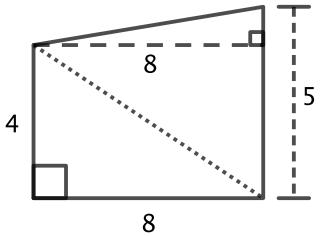
Therefore, the area of Shape 4 is $4 + 32 = 36$ cm^2.



Shape 4

Solution 2: Divide the shape into two triangles, as shown to the right.
The lower triangle has a base of 8 and a height of 4, so the area of the triangle is $\frac{8 \times 4}{2} = 16$. The upper triangle has a base of 5 and a height of 8, so the area of the triangle is $\frac{5 \times 8}{2} = 20$.

Therefore, the area of Shape 4 is $16 + 20 = 36$ cm^2.



Shape 4

Problème de la semaine

Problème B

Des nombres à l'horizon

Le 3 juin 1989, le SkyDome (maintenant connu comme le Rogers Centre) a ouvert ses portes au public.

a) Les Blue Jays de Toronto ont joué leur premier match de la Série mondiale au SkyDome, le 20 octobre 1992. Combien de temps, en jours, s'est écoulé entre l'ouverture du SkyDome et ce match de baseball? N'oublie pas que 1992 était une année bissextile.

b) Le coût total de construction du SkyDome était de 570$ millions. Si la construction a officiellement commencé le 3 octobre 1986, en moyenne combien d'argent a été dépensé par mois entre la date de début de la construction et l'ouverture?

c) Si les entrepreneurs en construction s'attendaient à ce que le coût total de la construction (570$ millions) représente en moyenne 15$ millions par année durant la vie utile du SkyDome, combien d'années pensaient-ils que le SkyDome serait ouvert?

Problem of the Week
Problem B and Solution
Skyline Numbers

Problem

On June 3, 1989 the SkyDome (now known as the Rogers Centre) opened its doors to the public.

a) The Toronto Blue Jays played their first World Series game at the SkyDome on October 20, 1992. How many days was this after the opening of the SkyDome? Don't forget that 1992 was a leap year.

b) The overall cost of the SkyDome was \$570 million. If construction officially began on October 3, 1986, how much money was spent on average each month from the date construction began until its opening?

c) If the original builders were expecting the total cost of \$570 million to average to a cost of \$15 million per year over the lifetime of the SkyDome, for how many years did the original builders expect the SkyDome to last?

Solution

a) The number of days after June 3, 1989 until October 20, 1992 can be calculated in this way:

Time	Number of days
June 4, 1989 - June 3, 1991	$365 \times 2 = 730$
June 4, 1991 - June 3, 1992*	366
June 4, 1992 - June 30, 1992	27
July 1992	31
August 1992	31
September 1992	30
October 1, 1992 - October 20, 1992	20
Total	1235

*1992 was a leap year.

b) The period from October 3, 1986 to June 3, 1989 is equal to 2 years and 8 months. This is equivalent to $2 \times 12 + 8 = 32$ months.
Thus, the average cost per month is $\$570\,000\,000 \div 32 = \$17\,812\,500$ per month.

c) The number of years they were expecting the SkyDome to last is $570\,000\,000 \div 15\,000\,000 = 38$ years.

Problème de la semaine

Problème B

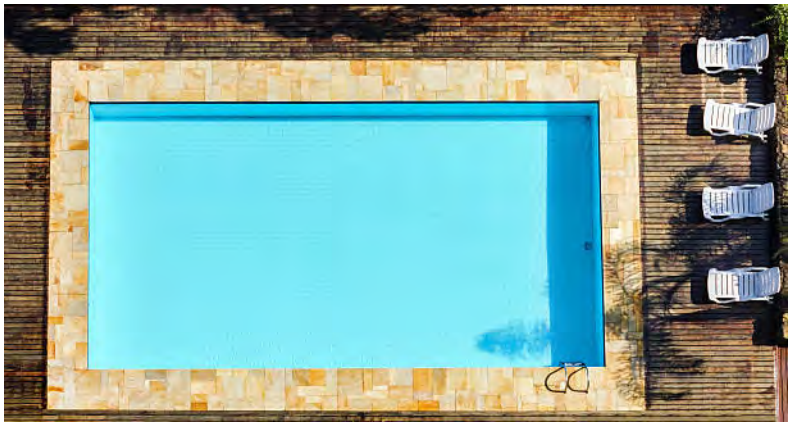
Les dalles de Pileta

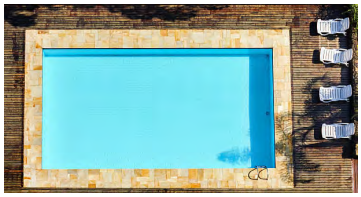
Pileta remplace les dalles autour de sa piscine creusée. Sa piscine mesure 10 m sur 5 m et est entourée d'une bordure de 1,5 m de dalles.

a) Combien de mètres carrés de dalles aura-t-elle besoin au total?

b) Si chaque dalle mesure 25 cm par 40 cm, en théorie, combien de dalles seront nécessaires?

c) Est-ce que ta réponse à la partie b) sera suffisante? Essaye de placer les dalles dans l'espace donné pour déterminer si Pileta en aura exactement assez pour construire la bordure ou s'il y aura des pertes dues aux coupures à faire, ce qui requerra des dalles supplémentaires.





Problem of the Week
Problem B and Solution
Piscine's Pool Pavers

Problem

Piscine is replacing the paving stones around her inground pool. Her pool is 10 m by 5 m, and is surrounded by a 1.5 m border of paving stones.

a) How many square metres of paving stones will she need in total?

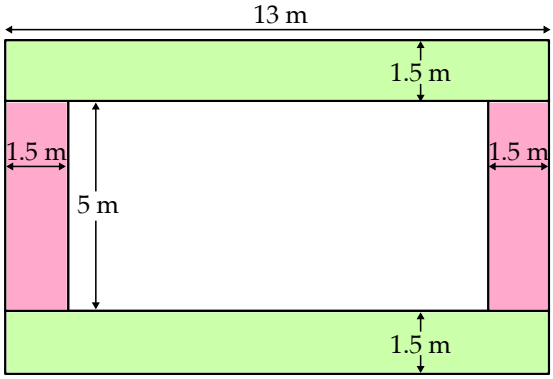
b) If each paving stone is 25 cm by 40 cm, in theory, how many paving stones will she need?

c) Will your answer in part b) actually be enough? Try fitting the stones in the space to see whether Piscine can complete the border with exactly that number of stones, or whether there will be waste, requiring some extras.

Solution

a) The area of paving stones needed can be calculated in several ways. In the two methods shown below, we divide the area into four rectangles.

Method 1:

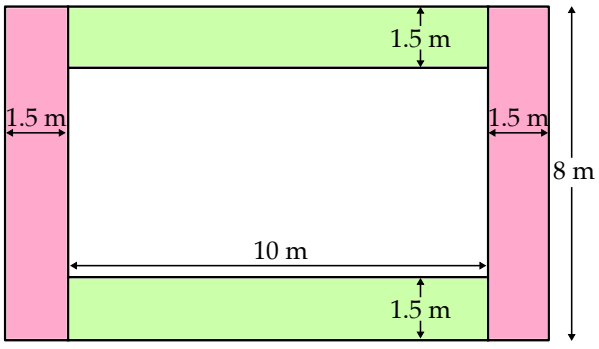


Top and Bottom Areas:
$(13 \times 1.5) \times 2 = 39$ m^2

Side Areas:
$(5 \times 1.5) \times 2 = 15$ m^2

Total Area:
$39 + 15 = 54$ m^2

Method 2:



Top and Bottom Areas:
$(10 \times 1.5) \times 2 = 30$ m^2

Side Areas:
$(8 \times 1.5) \times 2 = 24$ m^2

Total Area:
$30 + 24 = 54$ m^2

Either way, we see that Piscine needs 54 m^2 of paving stones.

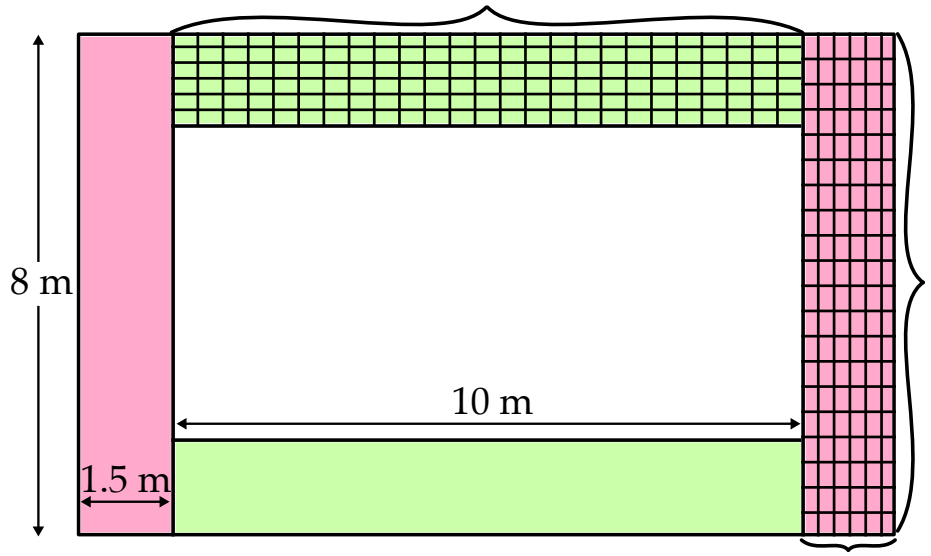
b) First we need to calculate the area of each paving stone in m^2. Since 1 cm = 0.01 m, each paving stone is 0.25 m by 0.4 m. So the area of each paving stone is

$$0.25 \times 0.4 = 0.1 \text{ m}^2$$

To calculate the number of paving stones needed, we can divide the total area we calculated in part a) by the area of each paving stone. Thus, the number of paving stones needed is $54 \div 0.1 = 540$ tiles.

c) If we divide the area as shown in Method 2 from part a), then the 540 paving stones will fit exactly in the space, as shown below.

$10 \div 0.4 = 25$, so 25 paving stones placed end to end (with their short sides touching) will fit here.



$8 \div 0.4 = 20$, so 20 paving stones placed end to end (with their short sides touching) will fit here.

$1.5 \div 0.25 = 6$, so 6 paving stones placed side by side (with their long sides touching) will fit here.

The paving stones may look a bit unusual, since they are placed in different directions so won't line up at the corners of the pool. However, the 1.5 m width is only evenly divisible by 0.25 m, not by 0.4 m, so for no waste, we're stuck with a solution where the paving stones are not all in the same direction.

Problème de la semaine

Problème B

C'est relatif

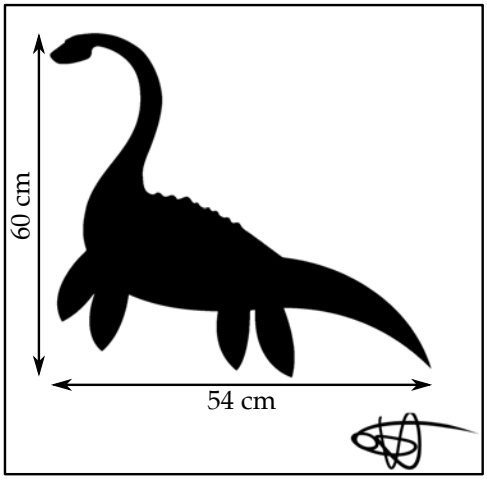
Jacob a une affiche d'un enderman, un personnage de Minecraft^{TM} et une affiche du monstre du Loch Ness sur son mur. Les dimensions de chaque affiche sont démontrées ci-dessous. Il souhaite créer un dessin plus petit, mais à l'échelle de chacun.

Jacob utilise une échelle de 1 : 6 pour dessiner son enderman. Il utilise une échelle différente pour dessiner le monstre du Loch Ness afin qu'il soit deux fois plus grand que le dessin de son enderman.

a) Quelle est la hauteur de son dessin du enderman?

b) Quelle échelle Jacob a-t-il utilisée pour dessiner le monstre du Loch Ness?

c) Quelle est la largeur du dessin du monstre du Loch Ness?



Problem of the Week
Problem B and Solution
It's All Relative

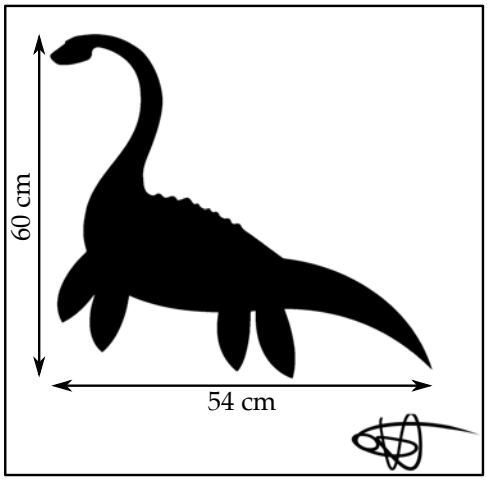
Problem

Jacob has a picture on his wall of an enderman Minecraft^{TM} character and another of the Loch Ness Monster. The dimensions of each are shown below. He wants to make a smaller scale drawing of each of them. Jacob uses a scale of $1 : 6$ to draw his enderman. He uses a different scale to draw the Loch Ness Monster so that it is twice as tall as his drawing of the enderman.

a) How tall is Jacob's drawing of the enderman?

b) What scale did Jacob use to draw the Loch Ness Monster?

c) How wide is Jacob's drawing of the Loch Ness Monster?



Solution

a) The original picture of the enderman is 90 cm tall, and Jacob is using a scale of $1 : 6$ to make his smaller drawing. Thus, Jacob's drawing is $90 \div 6 = 15$ cm tall.

b) Since Jacob's drawing of the Loch Ness Monster is twice as tall as his drawing of the enderman, that tells us his drawing of the Loch Ness Monster is $2 \times 15 = 30$ cm tall. The original picture of the Loch Ness Monster is 60 cm tall. So the scale is $30 : 60$, which is equivalent to $1 : 2$.

c) The original picture of the Loch Ness Monster is 54 cm wide, and Jacob is using a scale of $1 : 2$ to make his smaller drawing. Thus, Jacob's drawing is $54 \div 2 = 27$ cm wide.

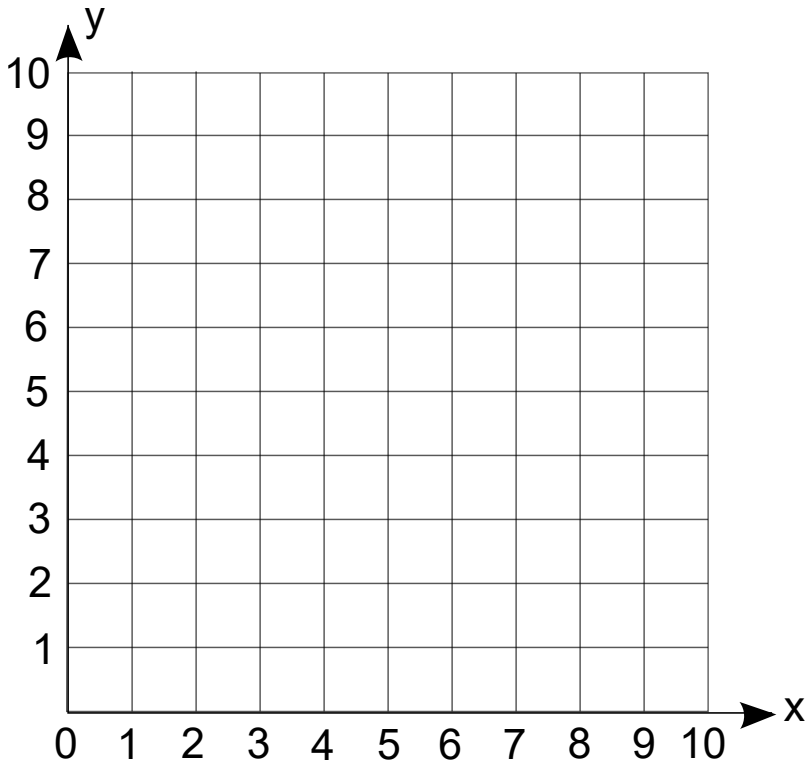
Problème de la semaine

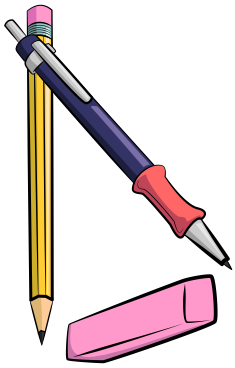
Problème B

Une aire estimée

a) Trace les points suivants dans le plan cartésien ci-dessous en respectant l'ordre. Relie chaque point au suivant avec une ligne droite.

$$(2,0),(4,4),(3,4),(5,6),(4,6),(6,8),(5,8),(8,10),$$
$$(7,9),(8,9),(6,7),(7,7),(5,5),(6,5),(4,3),(5,3),(2,0)$$

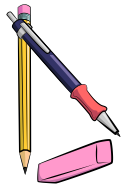




b) Estime combien d'unités carrés sont renfermées dans la figure créée à la partie a) en comptant les carrés complets et en combinant les carrés partiels pour former des carrés complets.

c) En utilisant ton estimation de la partie b), estime le pourcentage de la grille qui est occupé par la figure.

Tu n'imprimes pas cette page? Tu peux tracer les points sur notre page interactive.



Problem of the Week
Problem B and Solution
When Lightning Flashes, is it Raining?

Problem

a) Plot the following ordered pairs on the Cartesian plane. Join each point to the next with a straight line.

$$(2,0),(4,4),(3,4),(5,6),(4,6),(6,8),(5,8),(8,10),$$
$$(7,9),(8,9),(6,7),(7,7),(5,5),(6,5),(4,3),(5,3),(2,0)$$

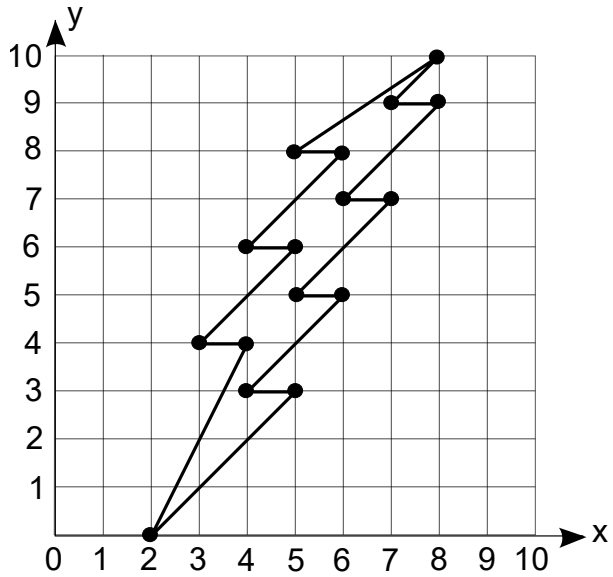
b) Estimate how many square units are enclosed by the figure created in part a) by counting whole squares and combining partial squares to make whole squares.

c) Using your estimate from part b), estimate the percent of the entire grid that is occupied by the enclosed shape.

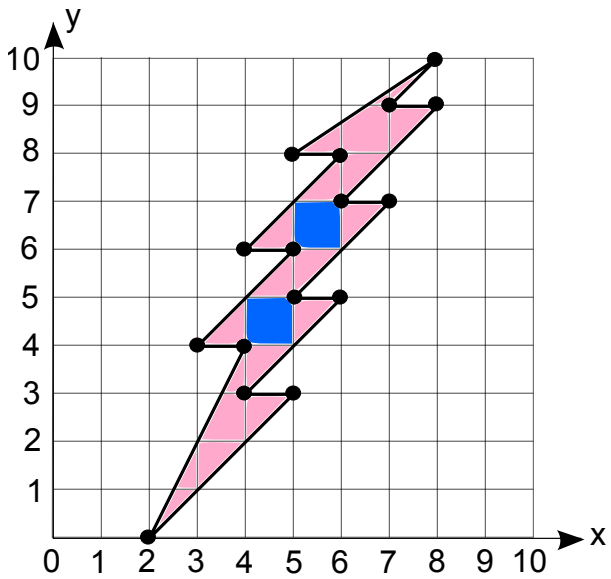
Not printing this page? You can plot the points on our interactive worksheet.

Solution

a) The points are plotted on the Cartesian plane.



b) Note that since this is an estimation, answers may vary.
The enclosed shape shown contains 2 whole squares and 19 partial squares.



For simplicity in our estimation, we will count all partial squares as half a square.
Thus, 19 partial squares $\div$ 2 = 9.5 whole squares.
Then, 9.5 whole squares + 2 whole squares = 11.5 whole squares.
Since each whole square has area 1 unit^2, that means approximately 11.5 units^2 are enclosed by the figure.

Note that since this is an estimation, it is not the only correct answer. It turns out that the exact area of the figure is 11 units^2. You can verify this as an exercise if you like, by dividing the figure into triangles.

c) There are 100 squares on this 10 by 10 grid.

In our estimation in part b), we found that 11.5 of the squares are occupied by the shape. Thus, about $\frac{11.5}{100} = 11.5\%$ of the entire grid is occupied by the enclosed shape.

Using the exact area given in part b), we find that $\frac{11}{100} = 11\%$ of the entire grid is occupied by the enclosed shape.

Algèbre (A)

Problème de la semaine

Problème B

Les balles de foin du fermier Mac

Les balles de foin du fermier Mac sont en forme de prisme rectangulaire. Chaque balle de foin mesure 2 m de long sur 2 m de large sur 1,5 m de haut. Les balles de foin sont alignées dans un champ avec la face carrée sur le sol et les faces rectangulaires en vis-à-vis. Le fermier Mac laisse 50 cm d'espace entre les balles de foin.

a) Détermine la longueur d'une rangée de 20 balles de foin.
b) Quelle est l'aire totale, en m^2, du sol en-dessous de 20 balles de foin?

Problem of the Week
Problem B and Solution
Farmer Mac's Bales

Problem

Farmer Mac's hay bales are in the shape of rectangular prisms. Each hay bale is 2 m long by 2 m wide by 1.5 m high. The hay bales lie in rows in a field with one of the square sides of each hay bale on the ground and the rectangular sides of the hay bales facing each other. Farmer Mac leaves a 50 cm space between each hay bale.

a) Determine the length of row of 20 hay bales.

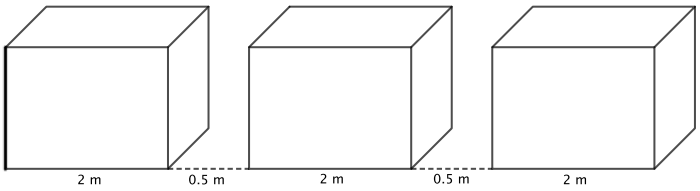
b) What is the total area, in m^2, of the ground underneath the 20 hay bales?

Solution

a) We will look at two ways to determine the length of a row of 20 hay bales.

The first way is by using a table.

The diagram below illustrates the first three bales, with 0.5 m between them (since 50 cm = 0.5 m).



The first bale is 2 m long, and each new bale after adds $2 + 0.5 = 2.5$ m to the length. We will show this in the following table.

bales	length
1	2
2	4.5
3	7
4	9.5
5	12
6	14.5
7	17
8	19.5
9	22
10	24.5

bales	length
11	27
12	29.5
13	32
14	34.5
15	37
16	39.5
17	42
18	44.5
19	47
20	49.5

Therefore, the length of a row with 20 hay bales is 49.5 m.

The second way we will find the length of a row with 20 bales is by setting up an algebraic expression.

If we let b represent the number of bales and s represent the number of spaces, then an algebraic expression for the length of a row of bales, in m, is

$$2 \times b + 0.5 \times s$$

Now, when there are 20 bales and 19 spaces the length becomes:

$$\begin{aligned} 2 \times 20 + 0.5 \times 19 &= 40 + 9.5 \\ &= 49.5 \end{aligned}$$

Therefore, the length of a row with 20 hay bales is 49.5 m.

b) The base of each hay bale is 2 m by 2 m.
So the area under each hay bale is $2 \times 2 = 4$ m^2.

There are 20 hay bales in the row, so the total area of the ground underneath the 20 hay bales is $20 \times 4 = 80$ m^2.

Problème de la semaine

Problème B

Fou des noix

Éric l'écureuil adore les noix. Il doit se préparer d'avance afin d'avoir assez de noix pour l'hiver, il décide donc de cacher des noix dans sa cour. Il les enterre d'une façon particulière afin de les retrouver facilement. Une partie de sa cour est démontrée dans la grille ci-dessous.

Pour cacher les noix, il utilise la stratégie suivante. En commençant au point X, il enterre 2 noix. Ensuite, il suivra les trois étapes suivantes.

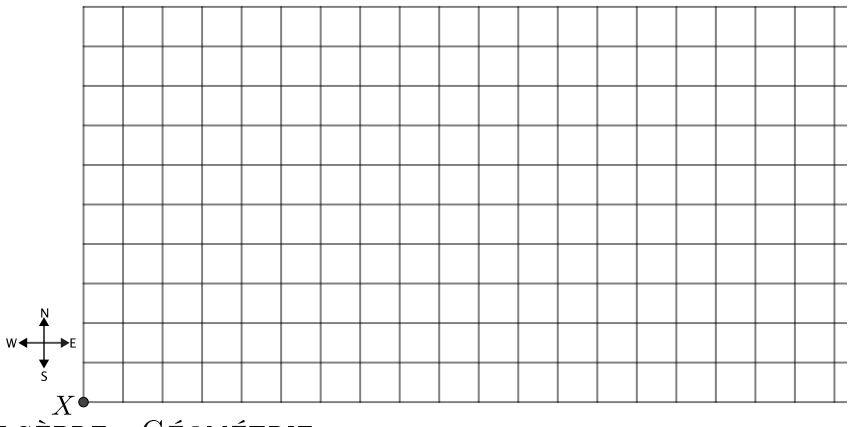
1. Il se déplace de 2 m vers le nord, 3 m vers l'est et 1 m vers le sud puis enterre 3 noix.
2. Il se déplace de 3 m vers le nord, 3 m vers l'est et 2 m vers le sud puis enterre 5 noix.
3. Il se déplace de 4 m vers le nord, 3 m vers l'est et 3 m vers le sud puis enterre 8 noix.

a) Sur la grille ci-dessous, identifie les positions des quatre premières cachettes d'Éric. Suppose que chaque ligne représente 1 m.

b) Suppose qu'Éric répète ces trois étapes à partir de la dernière place où il a caché des noix. Identifie les positions des trois prochaines cachettes.

c) Suppose qu'Éric répète ces trois étapes quatre autres fois. Utilise la régularité dans le nombre de noix enterrées pour déterminer combien de noix auront été cachées en tout.

VA PLUS LOIN: Réfère-toi aux points dans la grille de partie b). Décris comment Éric pourrait retrouver toutes ses cachettes en faisant le moins de pas possible.



THÈMES ALGÈBRE, GÉOMÉTRIE

Problem of the Week
Problem B and Solution
Squirrelly Over Nuts

Problem

Squiggles the Squirrel loves nuts. He has to be sure that he has enough for the winter, so he decides to hide a bunch around his yard. He buries them in a special way so that he will be able to find them. A portion of his yard is shown as a grid below.

In hiding the nuts, he uses the following plan. Starting at X he buries 2 nuts. He will then repeat the following three steps.

1. He moves 2 m north, 3 m east, and 1 m south, and then buries 3 nuts.
2. He moves 3 m north, 3 m east, and 2 m south, and then buries 5 nuts.
3. He moves 4 m north, 3 m east, and 3 m south, and then buries 8 nuts.

a) On the grid below, mark the positions of Squiggles' first four hiding spots. Assume each grid line measures 1 m.

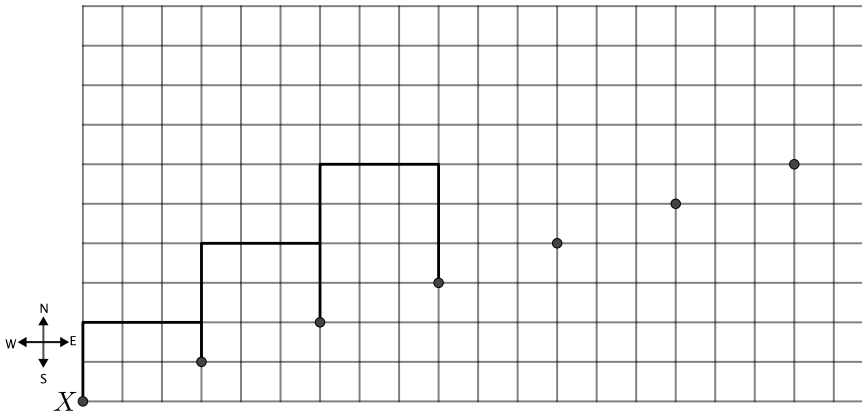
b) Suppose that Squiggles then repeats the three steps, starting from where he last buried nuts. Mark these next three hiding spots on your grid.

c) Suppose Squiggles repeats the three steps four more times. Use the pattern in the number of buried nuts to find how many nuts will he have hidden in total.

EXTENSION: Examine the points on your grid from part b). Describe how Squiggles could reach his hiding spots with the least amount of running around.

Solution

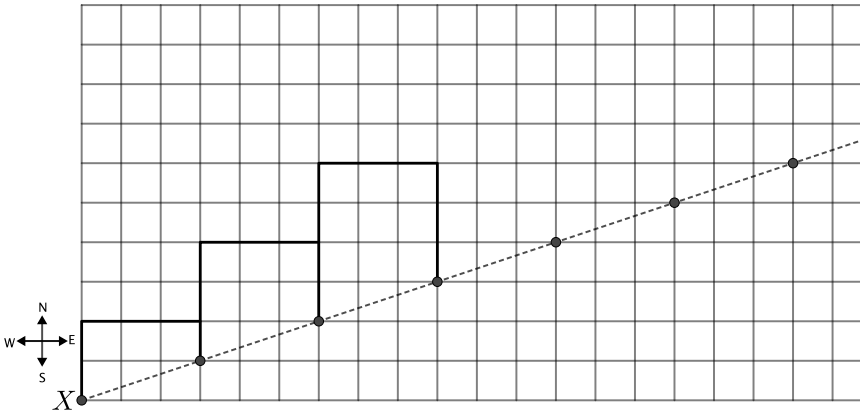
a),b) The grid below shows Squiggles' first four hiding spots with his path shown in bold lines, and the first repetition of steps 1, 2, and 3 of his plan.



c) During each repetition of steps 1, 2, and 3, Squiggles buries 3, then 5, then 8 nuts. Thus, with each repetition, he buries $3 + 5 + 8 = 16$ nuts. Since there are six repetitions in total, plus the 2 nuts he buried at X, he will have hidden a total of

$$6 \times 16 + 2 = 96 + 2 = 98 \text{ nuts}$$

EXTENSION: The grid below reveals that Squiggles' nuts are buried at points along the straight line (dotted) which, in effect, follows the pattern for every one square north it goes three squares east. Since the shortest distance between two points is along a straight line, he could save a lot of time and energy by just moving along this line and hiding his nuts at the appropriate points.
(But he's a squirrel, so he naturally likes to run about erratically!)



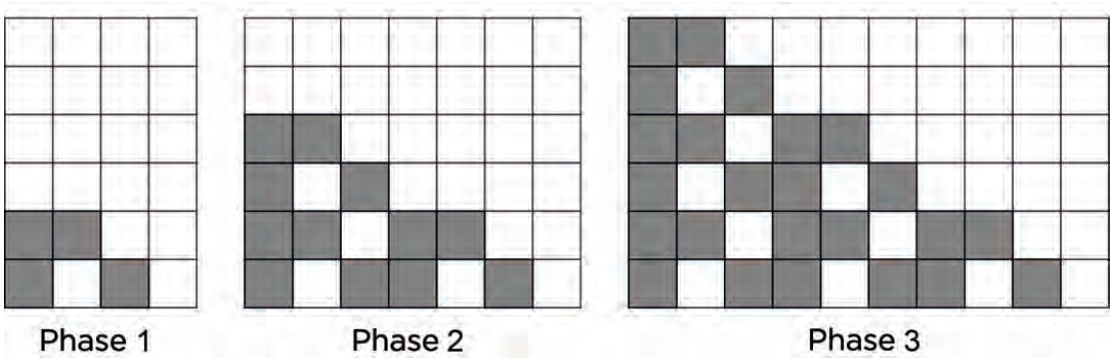
Problème de la semaine

Problème B

Les motifs d'Elsa

Elsa a déménagé au Royaume d'été mais les beaux motifs glacés de sa ville natale lui manquent. Elle décide d'utiliser un programme informatique et son imprimante pour créer des flocons de neige intéressants qu'elle pourra garder pendant toute l'année.

Les diagrammes ci-dessous illustrent les trois premiers flocons qu'elle a créés. Elle commence avec le flocon dans la phase 1. La phase 2 a été créée en ajoutant 2 copies du motif original à la phase 1. La phase 3 a été créée en ajoutant 3 copies du motif original à la phase 2. La phase 4 a été créée en ajoutant 4 copies du motif original à la phase 3 et ainsi de suite.



a) En utilisant du papier quadrillé, trace les motifs des phases 4 et 5. Si tu ajoutais d'autres phases en conservant cette régularité, y aura-t-il une phase avec la même base et hauteur?

b) Complète le tableau ci-dessous en remplissant le nombre de cases grises et blanches utilisées dans chaque phase et en déterminant le rapport entre le nombre de cases grises au nombre de cases blanches. Une case blanche doit être à l'intérieur du motif. C'est-à-dire, la case blanche doit partager un côté avec au moins trois cases grises.

Phase	Cases grises	Cases blanches	Rapport de cases grises à blanches
1	4	1	4 : 1
2			
3			
4			
5			

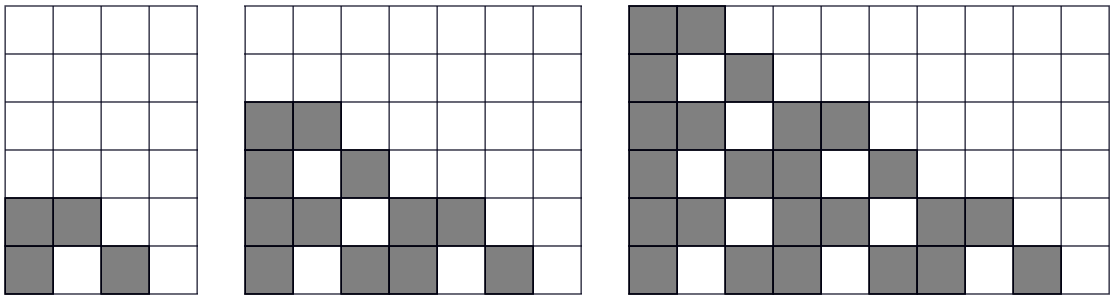
c) En te référant au tableau, comment peux-tu calculer le nombre de cases de chaque couleur à l'aide du numéro de phase. Utilise ta stratégie pour calculer le nombre de cases grises et le nombre de cases blanches à la phase 6.

Problem of the Week
Problem B and Solution
Elsa's Pattern

Problem

Elsa has moved to the Kingdom of Summer and misses the beautiful frosty patterns of her icy homeland. She has decided to use a computer program and her printer to create some interesting snowflakes that she can keep all year long.

Below are the first three sizes of snowflakes she has created. She starts with the pattern in Stage 1. Stage 2 was created by adding 2 copies of the original pattern to the Stage 1 pattern. Stage 3 was created by adding 3 copies of the original pattern to the Stage 2 pattern. Stage 4 would be created by adding 4 copies of the original pattern to the Stage 3 pattern, and so on.



a) Using grid paper, draw Elsa's design for Stages 4 and 5. If you were to continue the pattern to further stages, would a stage ever have the same width and height?

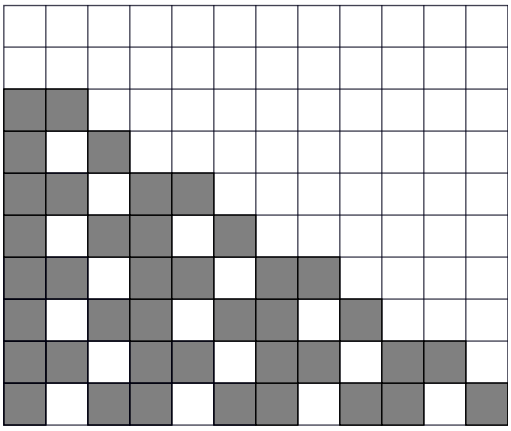
b) Complete the table below by entering how many grey and white squares Elsa has used at each stage, and calculating the ratio of grey to white squares. A white square must be within the pattern. That is, it must share a side with at least three grey squares.

Stage	Grey Squares	White Squares	Ratio of Grey to White Squares
1	4	1	4 : 1
2			
3			
4			
5			

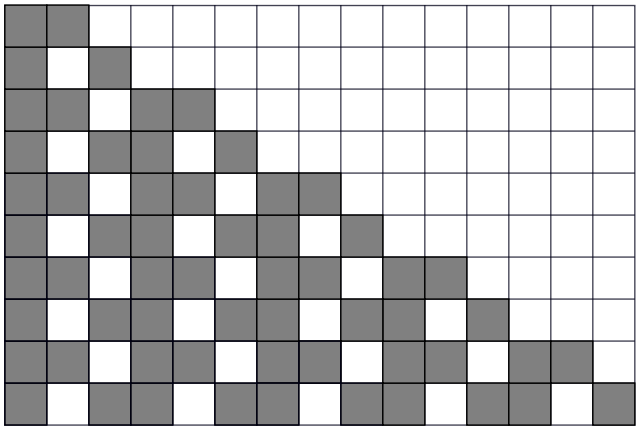
c) Using the table, how can you calculate the number of grey and white squares using only the stage number? Use your method to calculate the number of grey and white squares in Stage 6.

Solution

a) Elsa's designs for Stages 4 and 5 are shown.



Stage 4



Stage 5

Since the width increases by 3 squares and the height by 2 squares at each stage, the pattern will never have the same width and height.

b)

Stage	Grey Squares	White Squares	Ratio of Grey to White Squares
1	4	1	4 : 1
2	12	4	12 : 4 or 3 : 1
3	24	9	24 : 9 or 8 : 3
4	40	16	40 : 16 or 5 : 2
5	60	25	60 : 25 or 12 : 5

c) The number of white squares is equal to the stage number multiplied by itself. We call these numbers *perfect squares*.

$$\text{Number of white squares} = \text{Stage number} \times \text{Stage number}$$

To determine the number of grey squares in each stage, we add the stage number and the number of white squares, then multiply the result by 2. This is shown below using brackets, where we do the operations inside the brackets first.

$$\text{Number of grey squares} = (\text{Stage number} + \text{Number of white squares}) \times 2$$

So in Stage 6, the number of white squares is $6 \times 6 = 36$.

To determine the number of grey squares we first add $6 + 36 = 42$, then multiply by 2. So there are $42 \times 2 = 84$ grey squares in Stage 6.

Problème de la semaine
Problème B
De façon ordonnée

a) Lorsqu'on écrit l'année 2021, nous écrivons deux nombres consécutifs à deux chiffres (20 et 21). Trouve toutes les autres années entre 1000 et 2021 qui sont composées de deux nombres consécutifs à deux chiffres et insère-les dans le tableau ci-dessous.

b) Détermine la somme des nombres consécutifs à deux chiffres pour chaque année de la partie a) et insère-les dans le tableau ci-dessous. Par exemple, pour 2021, la somme est $20 + 21 = 41$. Décris la régularité formée par ces sommes.

c) Détermine le produit des nombres consécutifs à deux chiffres pour les 5 premières années du tableau. Ensuite, calcule la différence, en ordre, entre les produits. Par exemple, $10 \times 11 = 110$ et $11 \times 12 = 132$. Leur différence est $132 - 110 = 22$.
Tu vas finir avec cinq produits et quatre différences.

(i) Quelle régularité est formée par ces différences?
(ii) Utilise cette régularité pour trouver les autres produits, sans multiplier.

d) Quelle suite peux-tu former en combinant les nombres de la colonne des sommes avec ceux de la colonne des différences?

Année	Somme	Produit	Différence
1011	$10 + 11 = 21$	$10 \times 11 = 110$	—
1112	$11 + 12 = 23$	$11 \times 12 = 132$	$132 - 110 = 22$
2021	$20 + 21 = 41$	$20 \times 21 = 420$	

Problem of the Week
Problem B and Solution
In an Orderly Fashion

Problem

a) When we write the year 2021, we are writing two consecutive two-digit numbers (20 and 21). Find all the other years from 1000 to 2021 that are made up of two consecutive two-digit numbers written in order, and add them to the table below.

b) Find the sum of the consecutive two-digit numbers for each year from part a), and add this to the table below. For example, for 2021, the sum is $20 + 21 = 41$. Describe the pattern formed by these sums.

c) Find the product of the consecutive two-digit numbers for each of the first 5 years in the table. Then find the differences of these products, in order. For example, $10 \times 11 = 110$ and $11 \times 12 = 132$. The difference is $132 - 110 = 22$. You will have five products and four differences.

(i) What pattern is formed by the differences?

(ii) Use this pattern to find the remaining products, without multiplying.

d) What sequence of numbers can you form by combining the numbers in the sum column and the difference column?

Year	Sum	Product	Difference
1011	$10 + 11 = 21$	$10 \times 11 = 110$	—
1112	$11 + 12 = 23$	$11 \times 12 = 132$	$132 - 110 = 22$
2021	$20 + 21 = 41$	$20 \times 21 = 420$	

Solution

(a) There are 11 years from 1000 to 2021 that are made up of consecutive two-digit numbers written in order. They are
1011, 1112, 1213, 1314, 1415, 1516, 1617, 1718, 1819, 1920, and 2021

(b) The table shows that each sum is 2 more than the previous sum.

(c) (i) Each difference is 2 more than the previous difference.
If you fill in the difference column, then you can use that to fill in the product column. For example, the difference of products for 1112 is 22. This means that the next difference will be 24. Adding $132 + 24 = 156$, which is the next product. The entire table can be completed this way.

(ii) The completed table is below.

Year	Sum	Product	Difference
1011	21	110	—
1112	23	132	22
1213	25	156	24
1314	27	182	26
1415	29	210	28
1516	31	240	30
1617	33	272	32
1718	35	306	34
1819	37	342	36
1920	39	380	38
2021	41	420	40

(d) If we combine the numbers in these 2 columns, we get the sequence of whole numbers from 21 to 41.

Problème de la semaine

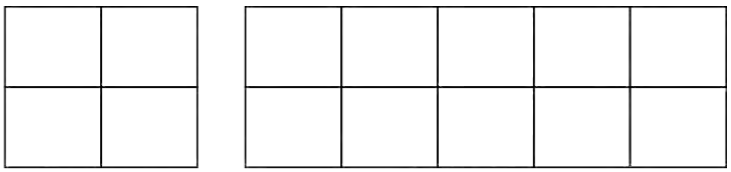
Problème B

Des piles de trois croustilles

Les croustille Dingles sont la collation préférée de Chip. Il aime les manger en faisant des petites piles de 3 croustilles pour créer des saveurs intéressantes. S'il n'a que des Dingles nature, il n'aurait qu'une seule façon d'empiler les trois croustilles. C'est-à-dire, nature, nature et nature, que nous allons noter comme nnn. L'ordre dans lequel les croustilles sont placées n'est pas important. Par exemple, si nous avons des croustilles aux saveurs nature et BBQ, placées dans l'ordre BBQ, BBQ, nature (bbn), c'est la même pile que la pile BBQ, nature, BBQ (bnb).

a) Suppose qu'il a deux saveurs de Dingles, nature et BBQ, dresse la liste des différentes piles de trois croustilles possibles.
b) Suppose qu'il a trois saveurs de croustilles, nature, BBQ et vinaigre, dresse la liste des différentes piles de trois croustilles possibles.
c) Suppose qu'il ajoute une quatrième saveur, ketchup, dresse la liste des différentes piles de trois croustilles possibles.

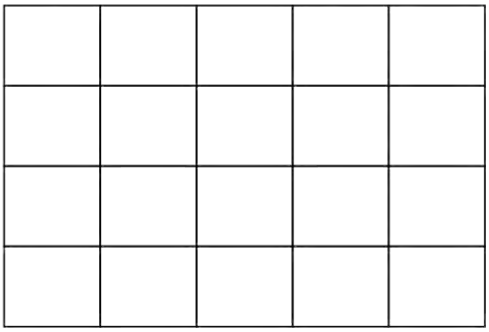
SUGGESTION: Tu peux utiliser les grilles de la page suivante pour t'aider à organiser ta solution. Tu vas peut-être vouloir utiliser la lettre n pour représenter nature, b pour BBQ, v pour vinaigre et k pour ketchup.



Partie a)

Partie b)

Partie c)



Problem of the Week
Problem B and Solution
Three-Chip Stacks

Problem

Chip's favourite snack food is Dingles potato chips. He enjoys layering 3 chips together to make a stack of interesting flavours. If he only has Regular flavoured Dingles, there is only one way to stack the three chips. That is Regular, Regular and Regular which can be written as rrr. The order in which the chips are layered does not matter. For example, if we have Regular and BBQ Dingles then the stack BBQ, BBQ and Regular (bbr) is the same as BBQ, Regular and BBQ (brb).

a) If he has Regular and BBQ flavoured Dingles, list all the different stacks of 3 chips he can make.

b) If he has three flavours of chips, Regular, BBQ, and Vinegar, list all the different stacks of 3 chips he can make.

c) If he adds a fourth flavour, Ketchup, list all the different stacks of 3 chips he can make.

SUGGESTION: You may use the following boxes to help you organize the possible stacks. You may also want to use r to represent Regular, b for BBQ, v for Vinegar, and k for Ketchup.

rrr	rrb
rbb	bbb

Part a)

rrr	rrb	rrv	rbb	rvv
rbv	bbb	bbv	bvv	vvv

Part b)

Part c)

rrr	rrb	rrv	rrk	rbb
rvv	rkk	rbv	rbk	rvk
bbb	bbv	bbk	bvv	bkk
bvk	vvv	vvk	vkk	kkk

Solution

The list for parts a), b), and c) are shown above. A solution using an exhaustive process is shown on the next page.

a)

Number of Regular	Number of BBQ	Possible Stack
3	0	rrr
2	1	rrb
1	2	rbb
0	3	bbb

b)

Number of Regular	Number of BBQ	Number of Vinegar	Possible Stack
3	0	0	rrr
2	1	0	rrb
2	0	1	rrv
1	2	0	rbb
1	0	2	rvv
1	1	1	rbv
0	3	0	bbb
0	2	1	bbv
0	1	2	bvv
0	0	3	vvv

c)

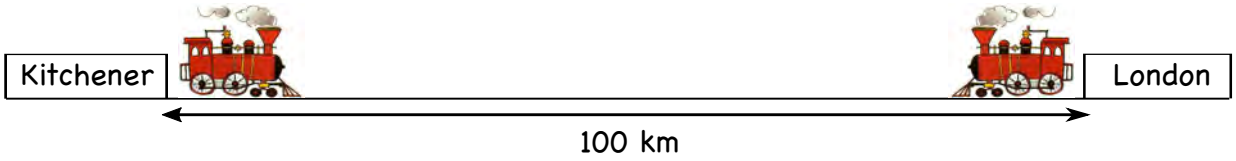
Number of Regular	Number of BBQ	Number of Vinegar	Number of Ketchup	Possible Stack
3	0	0	0	rrr
2	1	0	0	rrb
2	0	1	0	rrv
2	0	0	1	rrk
1	2	0	0	rbb
1	0	2	0	rvv
1	0	0	2	rkk
1	1	1	0	rbv
1	1	0	1	rbk
1	0	1	1	rvk
0	3	0	0	bbb
0	2	1	0	bbv
0	2	0	1	bbk
0	1	2	0	bvv
0	1	0	2	bkk
0	1	1	1	bvk
0	0	3	0	vvv
0	0	2	1	vvk
0	0	1	2	vkk
0	0	0	3	kkk

Problème de la semaine

Problème B

Midi pile, deux trains et une abeille

Les gares de Kitchener et de London sont à 100 km l'une de l'autre, le long d'une section droite de voie ferrée. Un train quitte la gare de Kitchener à midi et se dirige vers London. Un train différent quitte la gare de London à midi, utilise une voie ferrée parallèle à celle du premier train et se dirige vers Kitchener.



a) Le train de Kitchener voyage à une vitesse de 60 km par heure. Quelle est sa vitesse en km par minute?

b) Le train de London se déplace à une vitesse de 90 km par heure. Quelle est sa vitesse en km par minute?

c) Détermine l'heure à laquelle les trains vont commencer à se croiser. Pour se faire, il serait pourrait être utile de remplir le tableau ci-dessous.

Temps (en minutes à partir de midi)	Distance parcourue par le train de Kitchener	Distance parcourue par le train de London	Distance totale parcourue par les deux trains
10			
20			
30			
40			
50			
60			

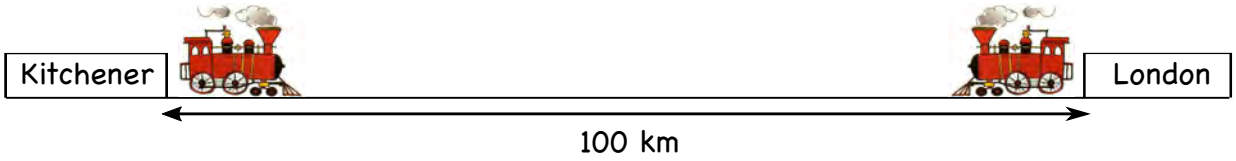
VA PLUS LOIN: Bert, l'abeille magique, vole aller-retour entre les deux trains à une vitesse de 120 km par heure pendant que les trains se rapprochent l'un de l'autre. Quelle est la distance totale parcourue par l'abeille jusqu'au moment où les trains commencent à se croiser?
(Note: Bert ne perdra pas de temps en changeant de direction.)

THÈMES ALGÈBRE, GÉOMÉTRIE

Problem of the Week
Problem B and Solution
High Noon, Two Trains, and a Bee

Problem

The Kitchener and London train stations are 100 km apart on a straight section of railroad. A train leaves Kitchener Station at noon, and travels toward London Station. A different train leaves London Station at noon, and travels toward Kitchener Station on a parallel track.



a) The train from Kitchener is travelling at 60 km per hour. What is its speed in km per minutes?

b) The train from London is travelling at 90 km per hour. What is its speed in km per minutes?

c) Find the time that the trains begin to pass each other. To do so, you may find completing the table below helpful.

Time (in minutes after noon)	Distance travelled by the train leaving Kitchener	Distance travelled by the train leaving London	Total distance travelled by the two trains
10	10	15	25
20	20	30	50
30	30	45	75
40	40	60	***100***
50	50	75	125
60	60	90	150

EXTENSION: Bert the magical bee flies at 120 km per hour back and forth between the two trains as they travel towards one another. What is the total distance he has travelled just as the trains begin to pass one another?
(Note: Bert will not lose any time as he changes direction.)

Solution

a) The train from Kitchener has a speed of
$60 \text{ km/hour} = \dfrac{60 \text{ km}}{60 \text{ min}} = 1 \text{ km/min}.$

b) The train from London has a speed of $\dfrac{90 \text{ km}}{60 \text{ min}} = 1.5 \text{ km/min}.$

c) The train from Kitchener has a speed of 1 km/min. Thus in 10 minutes, it will travel 10 km.
The train from London has a speed of 1.5 km/min. Thus in 10 minutes, it will travel 15 km.
We can now fill in the table. This is done on the previous page.
The two trains will begin to pass each other when the total distance travelled is equal to the distance between the two stations. The table values reveal that this occurs 40 minutes after noon.
Therefore, the trains begin to pass each other at 12:40 pm.

EXTENSION:
Magical Bert flies at 120 km/hr, or $\dfrac{120 \text{ km}}{60 \text{ min}} = 2 \text{ km/min}$, or 20 km in 10 minutes. Since the trains begin to pass one another after 40 minutes, Bert is flying back and forth between the trains for 40 minutes. Thus after 40 minutes, he will have flown $20 \text{ km} \times 4 = 80 \text{ km}$ in total.

Problème de la semaine

Problème B

Dans le pli..

a) Plie une feuille de papier en deux. Ensuite, ouvre la feuille et compte le nombre de rectangles créés. Écris ta réponse dans le tableau ci-dessous.

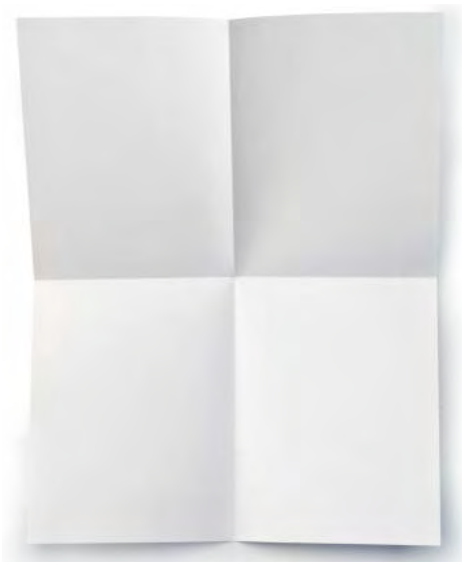
Maintenant, plie le papier en deux et puis plie-le en deux une autre fois. Ouvre la feuille de papier, compte le nombre de rectangles et écris ta réponse dans le tableau.

Répète en pliant 3 fois, puis 4 fois, en remplissant le tableau à chaque étape.

Continue en faisant le plus de plis que tu peux, tout en comptant le nombre de rectangles pour chaque nouveau pli.

Un morceau de papier de soie fonctionnerait le mieux pour cette activité. N'importe quelle taille de papier est suffisante, tant que le papier est rectangulaire.

Nombre de plis	Nombre de rectangles
1	
2	
3	
4	
5	
6	
7	



b) Écris une régularité qui décrit le changement dans le nombre de rectangles.

c) En utilisant ta régularité, prédit le nombre de rectangles qui seront créés en pliant le papier 8 fois.

Problem of the Week
Problem B and Solution
Into the Fold...

Problem

a) Fold a piece of paper in half. Unfold it and count the number of rectangles you created. Write your answer in the table below.

Now refold the paper in half, and then fold it in half again. Unfold it, count the rectangles, and write your answer in the table.

Repeat with 3 folds, and then with 4 folds, filling in the table as you go.

Keep trying for as many folds as you can, counting the number of rectangles with each fold.

Tissue paper works best for this activity. Any size is fine, but it should be rectangular.

b) Write a pattern rule for how the number of rectangles is changing.

c) Using your pattern rule, predict how many rectangles you would get if you could do 8 folds.

Solution

a) The completed table is shown below.

Number of Folds	Number of Rectangles
1	2
2	4
3	8
4	16
5	32
6	64
7	128

b) The number of rectangles starts with 2 and doubles each time. So the rule is

$$\text{number of rectangles} = \text{previous number of rectangles} \times 2$$

You could also write this rule using variables. Let n be the number of rectangles and p be the previous number of rectangles. Then the pattern rule would be $n = p \times 2$.

c) Since the number of rectangles doubles after every fold, after 8 folds there will be $128 \times 2 = 256$ rectangles.

Gestion des données (D)

Problème de la semaine

Problème B

L'honnêteté - la meilleure stratégie?

Une journaliste interview des participants d'un congrès où il y a 500 personnes.

- 40% de ces personnes disent toujours la vérité.
- 20 d'entre elles vont toujours mentir.
- Les autres personnes vont parfois dire la vérité et parfois mentir.

a) Suppose qu'elle interview une personne au hasard.

(i) Quelle est la probabilité, en fraction, que cette personne mente toujours?

(ii) Quelle est la probabilité, en fraction, que cette personne dise toujours la vérité?

b) Suppose qu'elle fait une entrevue avec Joe Publique, un participant du congrès. La dernière fois qu'elle l'a interviewé, il lui a dit la vérité, donc elle sait qu'il est soit une personne qui dit toujours la vérité ou une personne qui dit parfois la vérité et parfois des mensonges. Quelle est la probabilité que Joe Publique dise toujours la vérité?

Problem of the Week
Problem B and Solution
Honesty - the Best Policy?

Problem

A reporter is doing interviews at a convention attended by 500 people.

- 40% of these people always tell the truth.
- 20 of them will always lie.
- The remaining people each sometimes tell the truth and sometimes lie.

a) Suppose that she interviews a person at random.

(i) As a fraction, what is the probability that the person always lies?

(ii) As a fraction, what is the probability that the person always tells the truth?

b) Suppose she interviews Joe Public, a person at the convention. The last time she interviewed him, he only told her the truth, so she knows he must be a person who always tells the truth or a person who sometimes tells the truth and sometimes lies. What is the probability that Joe Public always tells the truth?

Solution

a) (i) Since there are 20 people who always lie out of 500 people, the probability she will at random interview someone who always lies is $\frac{20}{500}$ which can be reduced to $\frac{1}{25}$.

(ii) Since $40\% = \frac{40}{100}$ of the 500 people always tell the truth, the probability that the person always tells the truth is $\frac{40}{100}$. This can be reduced to $\frac{2}{5}$.

b) Since Joe has told the truth so far, we know that he does not always lie. There are 20 people that always lie. Therefore, Joe is one of the remaining $500 - 20 = 480$ people. Since 40% of the 500 people always tell the truth, that means 40 out of 100 people always tell the truth. We know $100 \times 5 = 500$. That means there are $40 \times 5 = 200$ people at the convention that always tell the truth. Therefore, the probability that Joe always tells the truth is $\frac{200}{480}$. This can be reduced to $\frac{5}{12}$.

Problème de la semaine

Problème B

C'est beaucoup d'eau

Lorsque tu achètes des produits, tu "consommes" l'eau qui est associée à la culture et/ou la fabrication de ces produits. Malgré le fait que c'est de l'eau réelle, nous l'appelons de "l'eau virtuelle". D'après les données de l'organisation "The World Counts", la quantité d'eau virtuelle consommée en moyenne par ces quatre différents items est montré dans le tableau ci-dessous.

Item	Quantité d'eau virtuelle (L)
un chandail en coton	2500
une feuille de papier	10
un sac de pépites de chocolat	7200
un hamburger	1800

(a) L'an dernier, Juan a acheté 6 chandails en coton, 500 feuilles de papier, 5 sacs de pépites de chocolat et 15 hamburgers. Dessine un diagramme à bandes qui démontre la quantité d'eau virtuelle qu'il a consommé l'an dernier en achetant ces items.

(b) Calcule la quantité totale d'eau virtuelle consommée par tous les items de ton graphique de la section (a). En moyenne, une douche de 10 minutes nécessite 200L d'eau. Combien de douches de 10 minutes seraient nécessaires pour consommer autant d'eau que ta quantité totale?

(c) Dans cette activité nous avons exploré la quantité d'eau virtuelle consommée dans la production de quatre items, cependant nous consommons de l'eau virtuelle en achetant n'importe quel produit. De quelles façons pourrais-tu réduire ta consommation d'eau virtuelle?

Problem of the Week
Problem B and Solution
That's a Lot of Water

Problem

When you buy items, you "use" water from wherever those items were grown and/or produced. This water is called "virtual" water, but the water is in fact very real. According to data from The World Counts, the amount of virtual water you use on average when you buy four different items is shown in the table.

Item	Amount of Virtual Water (L)
one cotton t-shirt	2500
one sheet of printer paper	10
one bag of chocolate chips	7200
one hamburger	1800

(a) Juan bought 6 cotton t-shirts, 500 sheets of printer paper, 5 bags of chocolate chips, and 15 hamburgers last year. Draw a bar graph to compare the amount of virtual water he used last year for each of the four items.

(b) Calculate the total amount of virtual water used for all the items in your graph from (a). On average, a 10 minute shower uses 200 L of water. How many 10 minute showers would it take to use that much water?

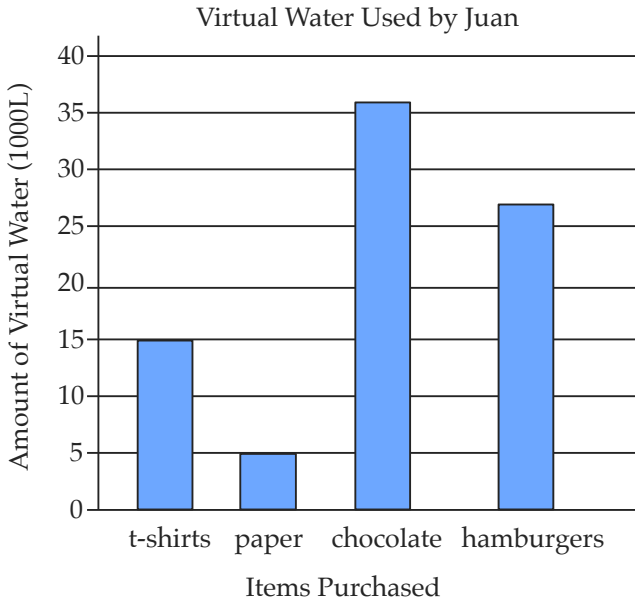
(c) In this activity we looked at the amount of virtual water used to produce four different items, but we use virtual water when we buy anything. What are some ways you can reduce the amount of virtual water you use?

Solution

(a) First we calculate the total amount of virtual water Juan used for each of the items.

$$\begin{aligned} \text{t-shirts:} \quad & 2500 \times 6 = 15\,000 \text{ L} \\ \text{paper:} \quad & 10 \times 500 = 5000 \text{ L} \\ \text{chocolate chips:} \quad & 7200 \times 5 = 36\,000 \text{ L} \\ \text{hamburgers:} \quad & 1800 \times 15 = 27\,000 \text{ L} \end{aligned}$$

The graph is shown below.



(b) To get the total amount of virtual water, add the four amounts we calculated in part (a).

$$15\,000 + 5000 + 36\,000 + 27\,000 = 83\,000$$

So 83 000 L of virtual water was used in total. To calculate the number of showers, we will divide this number by 200.

$$83\,000 \div 200 = 415$$

So it would take 415 showers to use that much water, on average.

(c) There are many ways we can reduce the amount of virtual water we use. Some of the ways are listed below.

- Take care of clothing so it lasts longer
- Buy secondhand items whenever possible
- Use paper only when necessary, and use both sides of the paper whenever you can
- Start a garden to grow your own fruits and vegetables
- Repair broken items instead of buying new ones

Problème de la semaine

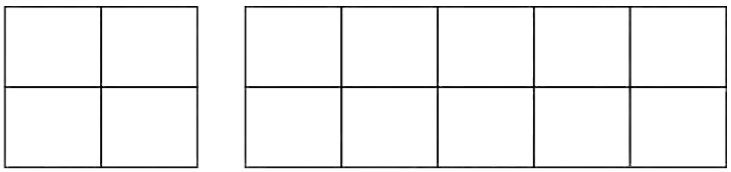
Problème B

Des piles de trois croustilles

Les croustille Dingles sont la collation préférée de Chip. Il aime les manger en faisant des petites piles de 3 croustilles pour créer des saveurs intéressantes. S'il n'a que des Dingles nature, il n'aurait qu'une seule façon d'empiler les trois croustilles. C'est-à-dire, nature, nature et nature, que nous allons noter comme nnn. L'ordre dans lequel les croustilles sont placées n'est pas important. Par exemple, si nous avons des croustilles aux saveurs nature et BBQ, placées dans l'ordre BBQ, BBQ, nature (bbn), c'est la même pile que la pile BBQ, nature, BBQ (bnb).

a) Suppose qu'il a deux saveurs de Dingles, nature et BBQ, dresse la liste des différentes piles de trois croustilles possibles.
b) Suppose qu'il a trois saveurs de croustilles, nature, BBQ et vinaigre, dresse la liste des différentes piles de trois croustilles possibles.
c) Suppose qu'il ajoute une quatrième saveur, ketchup, dresse la liste des différentes piles de trois croustilles possibles.

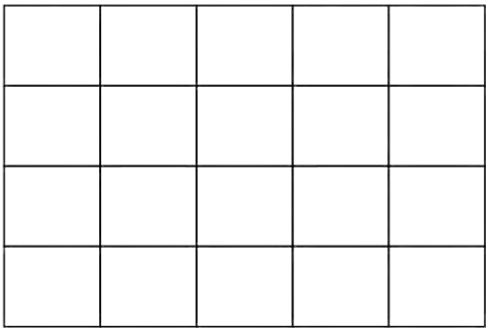
SUGGESTION: Tu peux utiliser les grilles de la page suivante pour t'aider à organiser ta solution. Tu vas peut-être vouloir utiliser la lettre n pour représenter nature, b pour BBQ, v pour vinaigre et k pour ketchup.



Partie a)

Partie b)

Partie c)



Problem of the Week
Problem B and Solution
Three-Chip Stacks

Problem

Chip's favourite snack food is Dingles potato chips. He enjoys layering 3 chips together to make a stack of interesting flavours. If he only has Regular flavoured Dingles, there is only one way to stack the three chips. That is Regular, Regular and Regular which can be written as rrr. The order in which the chips are layered does not matter. For example, if we have Regular and BBQ Dingles then the stack BBQ, BBQ and Regular (bbr) is the same as BBQ, Regular and BBQ (brb).

a) If he has Regular and BBQ flavoured Dingles, list all the different stacks of 3 chips he can make.

b) If he has three flavours of chips, Regular, BBQ, and Vinegar, list all the different stacks of 3 chips he can make.

c) If he adds a fourth flavour, Ketchup, list all the different stacks of 3 chips he can make.

SUGGESTION: You may use the following boxes to help you organize the possible stacks. You may also want to use r to represent Regular, b for BBQ, v for Vinegar, and k for Ketchup.

rrr	rrb
rbb	bbb

Part a)

rrr	rrb	rrv	rbb	rvv
rbv	bbb	bbv	bvv	vvv

Part b)

Part c)

rrr	rrb	rrv	rrk	rbb
rvv	rkk	rbv	rbk	rvk
bbb	bbv	bbk	bvv	bkk
bvk	vvv	vvk	vkk	kkk

Solution

The list for parts a), b), and c) are shown above. A solution using an exhaustive process is shown on the next page.

a)

Number of Regular	Number of BBQ	Possible Stack
3	0	rrr
2	1	rrb
1	2	rbb
0	3	bbb

b)

Number of Regular	Number of BBQ	Number of Vinegar	Possible Stack
3	0	0	rrr
2	1	0	rrb
2	0	1	rrv
1	2	0	rbb
1	0	2	rvv
1	1	1	rbv
0	3	0	bbb
0	2	1	bbv
0	1	2	bvv
0	0	3	vvv

c)

Number of Regular	Number of BBQ	Number of Vinegar	Number of Ketchup	Possible Stack
3	0	0	0	rrr
2	1	0	0	rrb
2	0	1	0	rrv
2	0	0	1	rrk
1	2	0	0	rbb
1	0	2	0	rvv
1	0	0	2	rkk
1	1	1	0	rbv
1	1	0	1	rbk
1	0	1	1	rvk
0	3	0	0	bbb
0	2	1	0	bbv
0	2	0	1	bbk
0	1	2	0	bvv
0	1	0	2	bkk
0	1	1	1	bvk
0	0	3	0	vvv
0	0	2	1	vvk
0	0	1	2	vkk
0	0	0	3	kkk

Problème de la semaine

Problème B

Lune rouge montante

Le 26 mai 2021, on pourra observer une éclipse lunaire totale dans de nombreuses régions du monde. La lune s'assombrira progressivement, puis prendra une couleur rouge cuivrée pendant seulement 14 minutes et 30 secondes.
Tu trouveras ci-dessous des données sur cette éclipse ainsi que d'autres éclipses lunaires totales récentes.

Mois et année	Durée (en minutes)
Mai 2003	52
Nov. 2003	24
Mai 2004	76
Oct. 2004	82
Mars 2007	74
Août 2007	90

Mois et année	Durée (en minutes)
Févr. 2008	50
Déc. 2010	74
Juin 2011	100
Déc. 2011	52
Avr. 2014	78
Oct. 2014	60

Mois et année	Durée (en minutes)
Avr. 2015	12
Sept. 2015	72
Janv. 2018	76
Juill. 2018	104
Janv. 2019	62
Mai 2021	14,5

a) Quelles sont les durées moyenne et médiane de ces éclipses totales de lune? (Comme le nombre d'éclipses répertoriées est pair, rappelle-toi que la médiane est la moyenne des deux nombres du milieu lorsque les données sont classées dans l'ordre.)

b) Crée un diagramme à barres montrant les durées des éclipses totales à partir de l'une des trois colonnes d'informations données.

c) Recherche les dates et les durées des quatre prochaines éclipses totales de lune.

Problem of the Week
Problem B and Solution
Bad Moon Rising

Problem

On May 26, 2021, a total lunar eclipse may be seen in many parts of the world. The moon will gradually become darker and then take on a rusty red colour for only 14 minutes and 30 seconds.

Below is data on this and other recent total lunar eclipses.

Month and Year	Duration (in minutes)	Month and Year	Duration (in minutes)	Month and Year	Duration (in minutes)
May 2003	52	Feb 2008	50	Apr 2015	12
Nov 2003	24	Dec 2010	74	Sept 2015	72
May 2004	76	Jun 2011	100	Jan 2018	76
Oct 2004	82	Dec 2011	52	Jul 2018	104
Mar 2007	74	Apr 2014	78	Jan 2019	62
Aug 2007	90	Oct 2014	60	May 2021	14.5

a) What are the mean and median durations of these 18 total lunar eclipses? (Since there is an even number of eclipses listed, recall that the median is the average of the middle two numbers when the data is arranged in order.)

b) For one of the three columns of given data, create a bar graph showing the durations of the total eclipses in that column.

c) Look up the dates and durations of the next four total lunar eclipses.

Solution

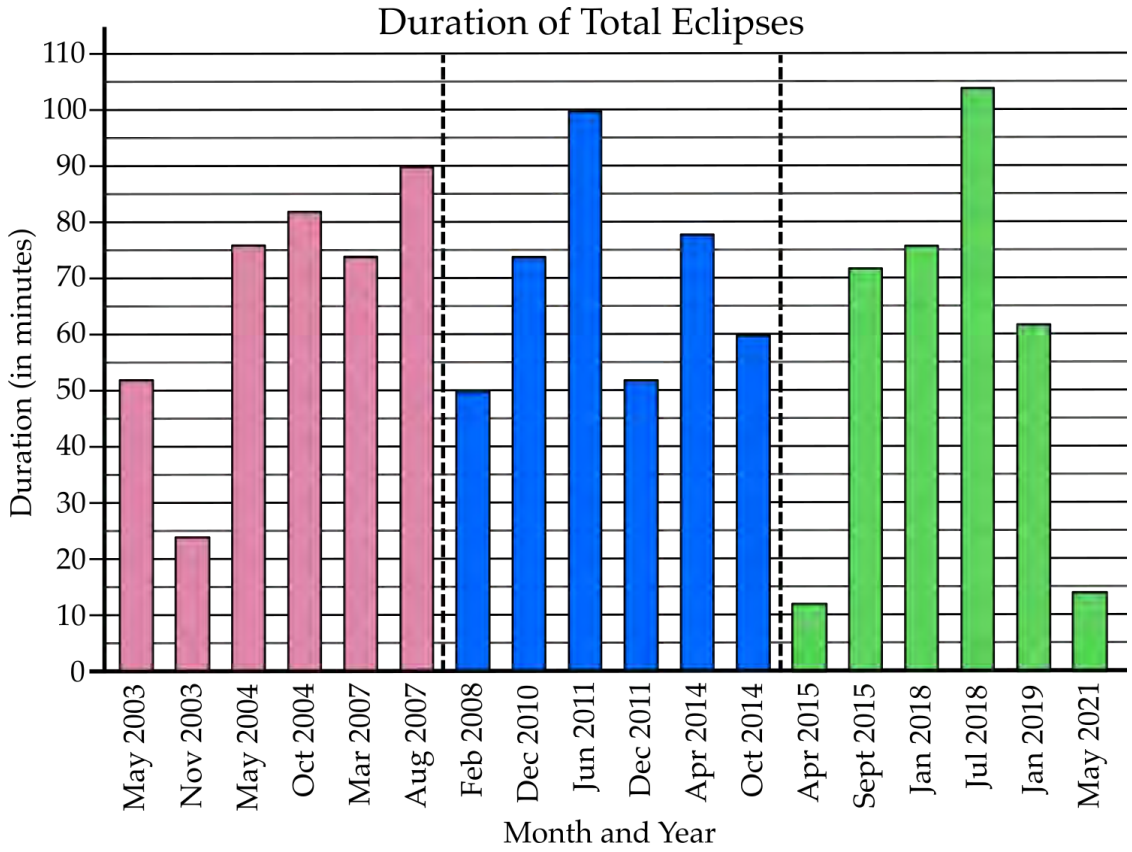
a) To calculate the mean duration, we first need to add up all the values from the table. When we do this, we get 1152.5 minutes. Then we divide this sum by the number of values in the table, which is 18. So the mean duration is $1152.5 \div 18 \approx 64.03$, or approximately 64 minutes.

To calculate the median duration, we can start by writing all the durations in order from smallest to largest.

$$12, 14.5, 24, 50, 52, 52, 60, 62, 72, 74, 74, 76, 76, 78, 82, 90, 100, 104$$

The middle two numbers are 72 and 74, so the median duration is the average of these two numbers, which is 73. If the average isn't immediately obvious, you can calculate it by adding 72 and 74 together, and then dividing the result by 2 to get 73.

b) Below is a bar graph for all the given data. (Check your chosen column.)



c) According to timeanddate.com, the next four total lunar eclipses and their durations are:

May 16, 2022	85 minutes
November 8, 2022	85 minutes
March 14, 2025	65 minutes
September 7, 2025	82 minutes

Pensée computationnelle (C)

Problème de la semaine

Problème B

Trouver sa place

Résous les casse-têtes suivants en utilisant les chiffres entre 1 et 9 pour remplir les cases de façon à ce que chaque expression horizontale et verticale soit vraie. Dans chaque casse-tête, utilise chaque chiffre une seule fois et applique les opérations en respectant l'ordre dans lequel elles apparaissent, de gauche à droite et de haut en bas.

a)

	+	6	x		=	56
+		+		−		
	−		+		=	12
÷		x		x		
	+		−		=	4
=		=		=		
5		50		3		

b)

	+		x		=	52
+		−		+		
	−		+		=	14
÷		x		÷		
7	+		÷		=	5
=		=		=		
2		21		5		

Dans le casse-tête a), l'emplacement du chiffre 6 est donné, donc les huit cases vides devront être remplies avec les chiffres de 1 à 9, sauf 6. Dans le casse-tête b), l'emplacement du chiffre 7 est donné, donc les huit cases vides devront être remplies avec les chiffres de 1 à 9, sauf 7.

Problem of the Week
Problem B and Solution
'Place' Value

Problem

Complete the puzzles below by entering the digits from 1 through 9 in the blank boxes to make all the horizontal and vertical statements true. In each puzzle, use each digit just once and do the operations in the order that they appear, from left to right and from top to bottom.

a)

	+	6	x		=	56
+		+		−		
	−		+		=	12
÷		x		x		
	+		−		=	4
=		=		=		
5		50		3		

b)

	+		x		=	52
+		−		+		
	−		+		=	14
÷		x		÷		
7	+		÷		=	5
=		=		=		
2		21		5		

In puzzle a), the location of the digit 6 has been given, so the eight empty boxes each contain a different digit from 1 through 9, other than 6. In puzzle b), the location of the digit 7 has been given, so the eight empty boxes each contain a different digit from 1 through 9, other than 7.

Solution

First, we will give you the final grids.

a)

1	+	6	x	8	=	56
+		+		−		
9	−	4	+	7	=	12
÷		x		x		
2	+	5	−	3	=	4
=		=		=		
5		50		3		

b)

5	+	8	x	4	=	52
+		−		+		
9	−	1	+	6	=	14
÷		x		÷		
7	+	3	÷	2	=	5
=		=		=		
2		21		5		

On the next page we will give a solution for each grid.

For puzzle a):
Label the unknown values with the letters shown below.

a	+	6	×	b	=	56
+	■	+	■	−	■	■
c	−	d	+	e	=	12
÷	■	×	■	×	■	■
f	+	g	−	h	=	4
=	■	=	■	=	■	■
5	■	50	■	3	■	■

Let's start with g. From the second column, we see that g must be 1, 2, or 5, since these are the only digits that divide into 50.
If $g = 1$, then $6 + d$ must be 50. This is not possible since d must be a single digit.
If $g = 2$, then $6 + d$ must be 25. This is not possible since d must be a single digit.
If $g = 5$, then since $10 \times 5 = 50$, $6 + d$ must be 10, and so $d = 4$. This is possible.
Therefore $g = 5$ and $d = 4$. We add these to the grid.

a	+	6	×	b	=	56
+	■	+	■	−	■	■
c	−	4	+	e	=	12
÷	■	×	■	×	■	■
f	+	5	−	h	=	4
=	■	=	■	=	■	■
5	■	50	■	3	■	■

Next, we'll look at b. From the first row, we see that b must be 1, 2, 4, 7 or 8, since these are the only digits that divide 56. However, b cannot be 4 since $d = 4$. Also, b cannot be 1 or 2 because then $a + 6$ must be 56 or 28, which are both not possible since a must be a single digit. Therefore, $b = 7$ or $b = 8$.
If $b = 7$, then $a + 6$ must be 8, and so $a = 2$.
If $a = 2$, then $c = 3$ and $f = 1$ or $c = 8$ and $f = 2$.
However, if $c = 3$, then $e = 13$. Since 13 is not a digit, this is not possible.
If $c = 8$, then both $a = 2$ and $f = 2$, which is not possible. Therefore, b cannot be 7.
Therefore, $b = 8$ and $a + 6$ must be 7, and so $a = 1$. We add these to the grid.

1	+	6	×	8	=	56
+	■	+	■	−	■	■
c	−	4	+	e	=	12
÷	■	×	■	×	■	■
f	+	5	−	h	=	4
=	■	=	■	=	■	■
5	■	50	■	3	■	■

Next, we'll look at c. From the first column, we know that $1 + c$ is a multiple of 5. This means c is either 4 or 9. Since $d = 4$, c cannot be 4.
Therefore, $c = 9$.
Since $c = 9$, then since $10 \div 2 = 5$ we must have $f = 2$.
From the second row, since $c = 9$, then $e = 7$.
From the third row, since $f = 2$, then $h = 3$ and the grid is now complete.

1	+	6	×	8	=	56
+	■	+	■	−	■	■
9	−	4	+	7	=	12
÷	■	×	■	×	■	■
2	+	5	−	3	=	4
=	■	=	■	=	■	■
5	■	50	■	3	■	■

For puzzle b):

Label the unknown values with the letters shown below.

A	+	B	×	C	=	52
+		−		+		
D	−	E	+	F	=	14
÷		×		÷		
7	+	G	÷	H	=	5
=		=		=		
2		21		5		

Let's start with G. From the second column, G must be a 1, 3 or 7 since they are the only single digits that divide into 21.
If $G = 1$, then $B - E$ must be 21. This is not possible since B and E must be single digits.
Also, G cannot be 7 since the digit 7 is already in the grid.
Therefore, $G = 3$. Looking at the third row, since $G = 3$ and $10 \div 2 = 5$, then $H = 2$. We add these to the grid.

A	+	B	×	C	=	52
+		−		+		
D	−	E	+	F	=	14
÷		×		÷		
7	+	3	÷	2	=	5
=		=		=		
2		21		5		

Next, we'll look at C. From the first row, C must be 1, 2, or 4, since they are the only single digits that divide into 52.
If $C = 1$, then $A + B$ must be 52. This is not possible since A and B must be single digits.
Also, C cannot be 2 since the digit 2 is already in the grid.
Therefore, $C = 4$.
From the third column, since $10 \div 2 = 5$, then $4 + F$ must be 10. This means $F = 6$. We add this to the grid.

A	+	B	×	4	=	52
+		−		+		
D	−	E	+	6	=	14
÷		×		÷		
7	+	3	÷	2	=	5
=		=		=		
2		21		5		

The numbers we have not used yet are 1, 5, 8, and 9. Using the second column, we see $B - E$ must be 7 since $21 \div 3 = 7$. The only two remaining numbers that can make this equation true are $B = 8$ and $E = 1$.
From the first row, since $13 \times 4 = 52$, $A + 8$ must be 13, and so $A = 5$. This leaves $D = 9$ and the grid is now complete.

5	+	8	×	4	=	52
+		−		+		
9	−	1	+	6	=	14
÷		×		÷		
7	+	3	÷	2	=	5
=		=		=		
2		21		5		

Problème de la semaine

Problème B

Des chèvres en bateau

Trois chèvres et trois lynx veulent traverser une rivière du côté sud au côté nord.

Ils ont seulement un petit bateau qui peut transporter exactement 1, 2 ou 3 animaux à la fois. Le problème pour les chèvres est qu'il ne peut jamais y avoir plus de lynx que de chèvres sur le bateau ni sur les côtés de la rivière.

Planifie un ensemble de voyages d'un côté à l'autre de la rivière pour que tous les animaux se retrouvent du côté nord de la rivière ensemble en t'assurant qu'il n'y a jamais plus de lynx que de chèvres sur le bateau ni sur les côtés de la rivière. Le tableau peut t'aider à organiser ton raisonnement.

SUGGESTION: Mets en scène ce problème avec trois élèves qui jouent le rôle des lynx et trois élèves qui jouent le rôle des chèvres.

Voyage	Animaux du côté sud	Sur le bateau	Animaux du côté nord
0	3C, 3L		0
1		→	
2		←	
3		→	
4		←	
5		→	
6		←	

THÈME PENSÉE COMPUTATIONNELLE

Problem of the Week
Problem B and Solution
Goats in a Boat?

Problem

Three goats and three bobcats want to cross a river from the south side of the river to the north side of the river.

All they have is a small boat which can carry exactly 1, 2 or 3 animals at a time. The problem is that if the bobcats outnumber the goats on either riverbank or in the boat, then bad things will happen to the goats.

Design a set of trips back and forth across the river so that all the animals end up on the north side together and such that the goats are never with more bobcats on either riverbank or in the boat. The table may help to organize your thinking.

Trip	Animals on South Side	In the Boat	Animals on North Side
0	3G, 3B		0
1	2G, 2B	1G, 1B→	1G,1B
2	3G, 2B	←1G	1B
3	2B	3G→	3G, 1B
4	3B	←1B	3G
5	0	3B→	3G, 3B

Solution

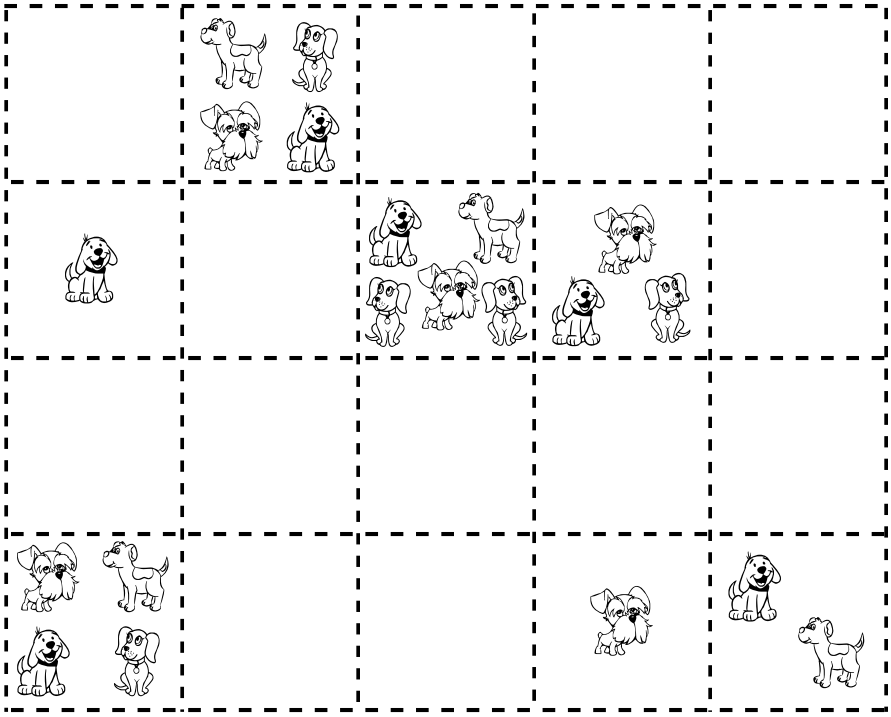
The completed table above reveals that the trip can be safely accomplished in 5 crossings, 3 from south to north and 2 return trips north to south. The number of animals on each side are totals after each trip is done.

There are many other solutions. Here is another possibility.

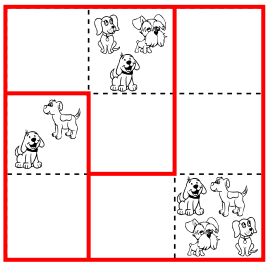
Trip	Animals on South Side	In the Boat	Animals on North Side
0	3G, 3B		0
1	3G, 1B	2B→	2B
2	3G, 2B	←1B	1B
3	1G, 1B	2G, 1B→	2G, 2B
4	2G, 2B	←1G, 1B	1G, 1B
5	1B	2G, 1B→	3G, 2B
6	1G, 1B	←1G	2G, 2B
7	0	1G, 1B→	3G, 3B

Problème de la semaine
Problème B
Des grilles chaotiques

La grille suivante est composée de quatre rangées, chacune possédant 5 cases qui mesurent 1 par 1. Sept cases contiennent des groupes de chiens. Ces chiens jouent bien avec les autres chiens dans leur groupe, mais ne jouent pas bien avec les chiens des autres groupes. Tu veux séparer les groupes de chiens en construisant des clôtures le long des lignes pointillées.



a) Trouve deux façons de construire les clôtures pour séparer la grille en sept régions distinctes, afin de t'assurer que chaque région a le même nombre de cases 1 par 1 que de chiens.
Voici un exemple d'une grille 3 par 3, séparée en trois régions distinctes.



b) Partage tes solutions avec tes camarades de classe. Leurs solutions sont-elles différentes des tiennes?

c) Place les sept groupes de chiens dans différentes cases de la grille et répète la partie a). Y a-t-il des arrangements pour lesquels il n'existe AUCUNE solution?

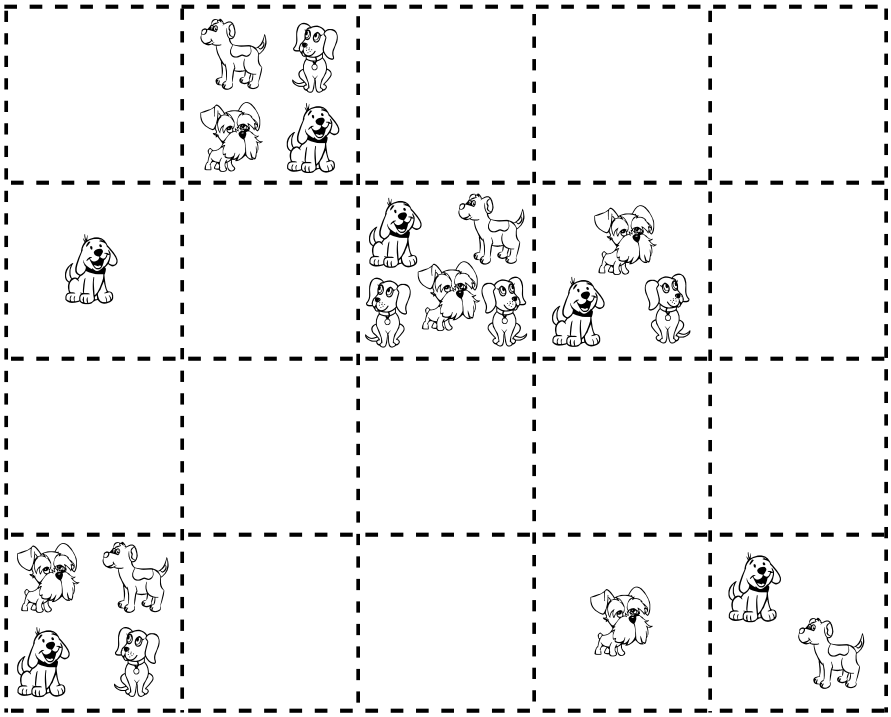
Si tu n'imprimes pas cette page, tu peux faire le travail à partir de notre grille interactive.

Thèmes Pensée computationnelle, Géométrie

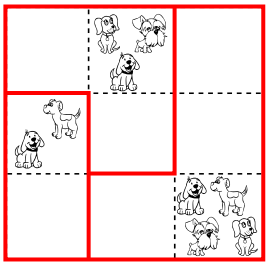
Problem of the Week
Problem B and Solution
Crazy Grids

Problem

The grid below consists of four rows, each with five 1 by 1 squares. Seven of these squares contain groups of dogs. These dogs play nicely with other dogs in their own group, but do not play well with the dogs in other groups. You would like to separate the groups of dogs by putting up fences along some of the dashed gridlines.



a) Find two ways to put up fences that would divide the grid into seven distinct regions, so that each region contains the same number of 1 by 1 squares as dogs.
An example of a different 3 by 3 grid divided into three such regions is shown to the right.



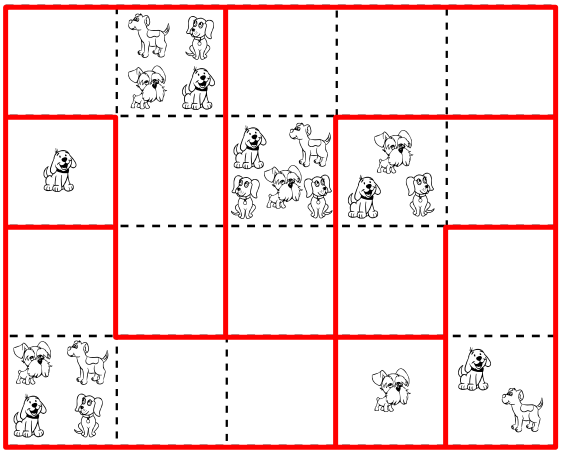
b) Share your solutions with your classmates. Did they find solutions different from yours?

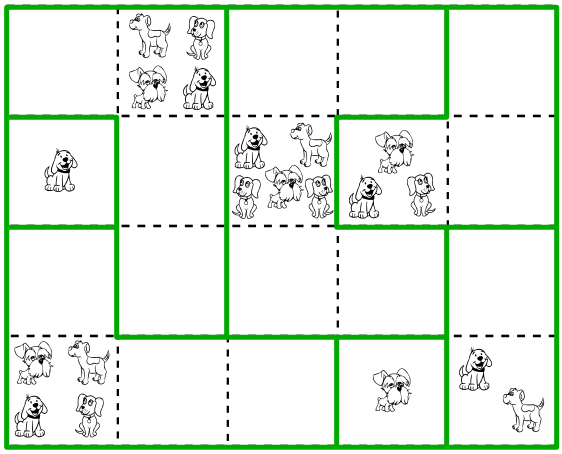
c) Move the seven groups of dogs to different squares in the grid, and repeat part a) using your new grid. Did you find any arrangements for which there was NO solution?

Not printing this page? You can divide the grid on our interactive worksheet.

Solution

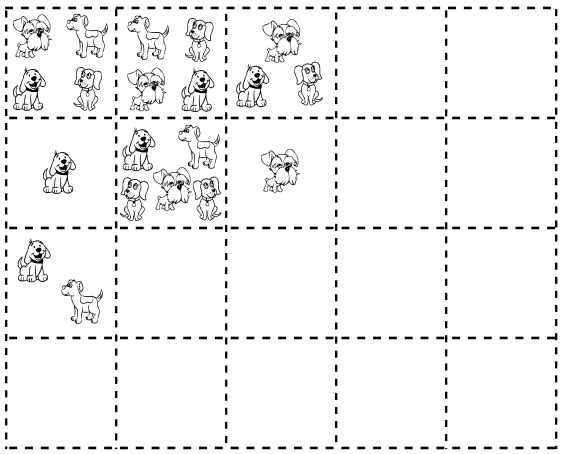
a) Two different solutions are shown below.





b) There are six solutions in total. See if you can find them all!

c) There are many ways to place the dogs. One arrangement for which there is NO solution is to place all seven squares with dogs clustered together in one corner of the grid, like in the grid below.



Since there are seven groups of dogs and we want to divide the grid into seven distinct regions, each group of dogs except the single dogs needs adjacent empty squares in order for a solution to exist. When all the dogs are clustered together like this, there aren't enough adjacent empty squares, so it is not possible to find a solution.