

# Math 9 Honours

## Logic Puzzle

## Challenge

## Booklet

Name: \_\_\_\_\_

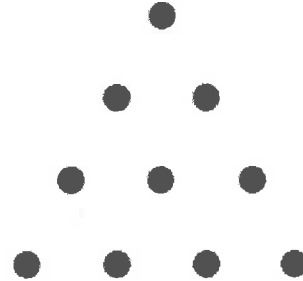
Period: \_\_\_\_\_



Name: \_\_\_\_\_

### Logic Problems

1) Move only three dots to flip the triangle upside down.



2)

### Logic Problem

Use the table to help you solve the logic problem. Each square represents a possible answer. Follow the rows and columns to find the correct combination. Draw a dot in a square for the answer where the vertical and horizontal squares meet. Draw an "x" in a square that isn't the answer.

	Game	Doll	Kite	Basketball	Blue	Green	Red	Orange
Hannah								
Jack								
Cassie								
Paul								
Blue								
Green								
Red								
Orange								

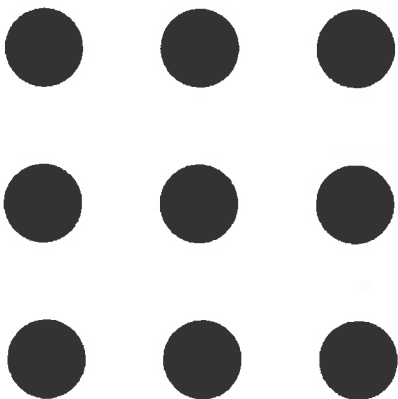
Hannah, Jack, Cassie and Paul attend a birthday party. They each bring a gift: a kite, doll, game, and basketball. After the party, each child goes home with a different color balloon: red, blue, green, and orange. Using the clues given, figure out which child brought what gift, and what color balloon they went home with.

- Hannah did not bring the doll as a gift but she did go home with a blue balloon.
- Jack brought the basketball for a gift but did not go home with a red or green balloon.
- The child who brought the kite for a gift went home with a red balloon.
- Cassie brought the doll as a gift.

3) How many different ways can the letters A, B, C, D, E be arranged?

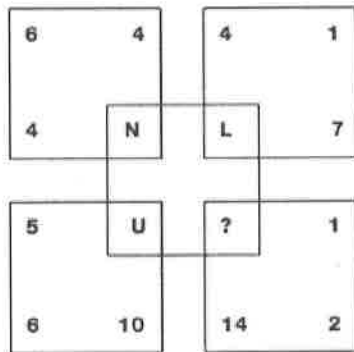
4) If 15 basketball teams are in a tournament, and each team plays every other team once, how many games in total will be played?

5) Without lifting your pencil, connect all the dots using 4 straight lines.



6)

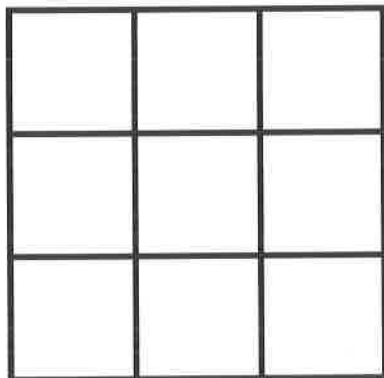
Which letter replaces the question mark?



7) A wizard has 8 golden spheres, 7 of which are real gold. The fake sphere is just slightly lighter than the real ones, although you cannot tell by just using your hands. The wizard will let you keep all of the golden spheres if you can definitively find the fake using an old-fashioned scale ONLY TWICE. Explain how to do it:



8) Can you arrange the numbers 1 through 9 (can only use each number once) into this 3 x 3 square so that every row, column and even the two diagonals add up to 15?



9) Use each of the following numbers only once, and put one digit in each box to make 100.

0 1 2 3 4 5 6 7 8 9

$$\square \times \square + \square + \square + \square + \square + \square + \square + \square - \square = 100$$

10) Arturo has 8 white socks, 4 blue socks, 10 gray socks, and 12 black socks in his sock drawer. The socks are all jumbled up.

Arturo reaches into the sock drawer in the dark.

**What is the greatest number of socks that he would need to pull out to make sure he has a matching pair?**

11) Scales #1 and #2 are in perfect balance. How many Xs must you put on the right side of Scale #3 to make it balance?

**Scale #1**

Left side: XYZ    Right side: XXXY

**Scale #2**

Left side: YYY    Right side: XXZ

**Scale #3**

Left side: YYZ    Right side: ?

12) Can you fill in the missing square with the number that logically belongs there?

2	2	2	2
2	6	10	14
2	10	26	50
2	14	50	

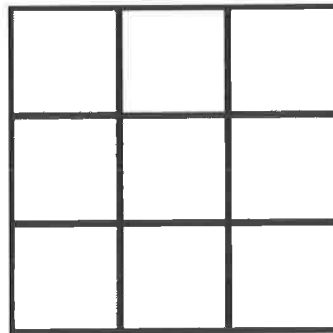
13) Froggie fell down a 10-foot well. He cannot hop out. He has to climb out. He climbs three feet a day, but during the night, while resting, he slips back two feet. At this rate, how many days will it take Froggie to climb out of the well?

14) What is the number missing from the following sequence?

**4 7 11 18 29 47 \_\_\_\_ 123 199 322**

15) You have a 3 and a 5 litre water container, each container has no markings except for that which gives you its total volume. You also have a running tap. You must use the containers and the tap in such a way as to exactly measure out 4 litres of water. How is this done?

16) How many squares are there?







# PETAL POINTS 1

For her birthday, four of Aunt Clara's nieces and nephews sent her beautiful bouquets. Each person selected an arrangement that contained a different type of flower in a different color (including pink), and each bouquet arrived in a different container. After receiving these lovely gifts, Aunt Clara's happiness was in full bloom! From the information provided, determine the color of the flowers (including lilies) that were selected by each person and the container in which each person's bouquet arrived.

1. One bouquet consisted of red roses.
2. Kayla's bouquet arrived in a pitcher.
3. Joni's bouquet wasn't in a vase.
4. Robin selected white flowers (but not tulips).
5. Melvin chose a bouquet composed of carnations.
6. If the yellow flowers arrived in a vase, then Melvin's bouquet came in an oversize cocktail glass; otherwise, the yellow flowers arrived in a basket, and Melvin's bouquet was placed in a vase.

		COLOR				FLOWERS				CONTAINER			
		PINK	RED	WHITE	YELLOW	CARNATIONS	LILIES	ROSES	TULIPS	BASKET	COCKTAIL GLASS	PITCHER	VASE
PERSON	JONI												
	KAYLA												
	MELVIN												
	ROBIN												
CONTAINER	BASKET												
	COCKTAIL GLASS												
	PITCHER												
	VASE												
FLOWERS	CARNATIONS												
	LILIES												
	ROSES												
	TULIPS												

PERSON	COLOR	FLOWERS	CONTAINER

Like many music fans her age, Britney's mind often wanders to thoughts of the boy band Dreamboat when she should be paying attention in class. Today, Britney tuned out several times during the school day. While daydreaming in each of four classes, she wrote the name of a different band member on a different page in her notebook using a different colorful pen. Under each name, Britney made a different doodle (one is a heart) before being called on by the teacher to answer a question. Luckily, one of her friends was able to text her the answer, so it didn't look like she wasn't paying attention! From the information provided, determine the class in which Britney sketched on each notebook page (10, 14, 18, or 24) and the pen she used while writing it, as well as the boy's name and doodle that appear on each page.

1. The four names are David, Nick, the one written with the Berry Splash pen, and the name Britney doodled in math class.
2. Britney used the Glitterati pen and doodled a star in English class and in math class, in some order; one of these doodles is on page 10 of her notebook.
3. Britney used the Hot Pink Panic pen to write Rob's name. Britney doodled Keith's name in science class.
4. The lips were doodled on the page numbered exactly 4 lower than the page on which Britney used the Purplosion pen (which wasn't used to write David's name).
5. The smiley face (which wasn't doodled in science class) appears on a higher-numbered page than the doodle Britney made in history class.

		PAGE				PEN				BOY				DOODLE			
		10	14	18	24	BERRY SPLASH	GLITTERATI	HOT PINK PANIC	PURPLOSION	DAVID	KEITH	NICK	ROB	HEART	LIPS	SMILEY FACE	STAR
CLASS	ENGLISH																
	HISTORY																
	MATH																
	SCIENCE																
DOODLE	HEART																
	LIPS																
	SMILEY FACE																
	STAR																
BOY	DAVID																
	KEITH																
	NICK																
	ROB																
PEN	BERRY SPLASH																
	GLITTERATI																
	HOT PINK PANIC																
	PURPLOSION																

CLASS	PAGE	PEN	BOY	DOODLE

# LESSEN PLANS 20

Loretta and four of her closest friends spend a lot of time together, but last week the group had some difficulties meeting up. The friends had five activities planned, each on a different day (Sunday, Tuesday, Wednesday, Friday, or Saturday). Unfortunately, on each day, a different friend had to cancel, each one for a different reason (one person had to work late at the office). The other four friends went through with their plans regardless, but they are definitely getting together tonight, no matter what life throws at them! From the information provided, determine the day on which the five friends planned each activity (including poker night), the friend who canceled on each day, and the reason that each person couldn't make it.

1. Violet (whose cat, Mr. Fluffington, got sick) canceled the day after the group went out to dinner.
2. Ron had a blistering headache, so he couldn't join the others at the dance class. The friends went to the local winter carnival on Wednesday night.
3. The friend who didn't make it to dinner isn't the one who had to cancel because his or her car broke down. Gail's parents didn't come to town this week. Barry isn't the friend who missed out on the movie.
4. The friend whose parents made a surprise visit canceled at some point earlier in the week than Barry but at some point later in the week than the one who didn't make it to dinner.

		ACTIVITY					FRIEND					REASON				
		CARNIVAL	DANCE CLASS	DINNER	MOVIE	POKER NIGHT	BARRY	GAIL	LORETTA	RON	VIOLET	CAR	HEADACHE	PARENTS	SICK CAT	WORK LATE
DAY	SUNDAY															
	TUESDAY															
	WEDNESDAY															
	FRIDAY															
	SATURDAY															
REASON	CAR															
	HEADACHE															
	PARENTS															
	SICK CAT															
	WORK LATE															
FRIEND	BARRY															
	GAIL															
	LORETTA															
	RON															
	VIOLET															

DAY	ACTIVITY	FRIEND	REASON



After weeks of auditions, the field has been narrowed to five actresses who are vying for the title role in a new Broadway production of *Medea*. All five women have previous experience with the role, as each one had played the part in a different year (2004 through 2008). Each actress (including Melanie) performed the role in a different theater in a different state (two of which—California and Oregon—are West Coast states, and three of which—New Hampshire, Rhode Island, and Vermont—are East Coast states). The casting directors are in quite a state trying to choose among these talented actresses! From the information provided, determine the year, state, and theater in which each actress (identified by first and last names) portrayed *Medea*.

1. Ms. Merwald and Ms. Spragg performed the role in 2006 and 2008, in some order. Sonia didn't perform at the Palace Theater. Amber (who isn't Ms. Greer) didn't perform in Oregon.
2. Four of the women are Olivia (who played *Medea* in an East Coast state), the one who performed the role in 2004 (who isn't Ms. LaNasa), the woman who performed the role at the Prince Theater, and the one who performed in New Hampshire.
3. The plays that ran in 2004, 2005, and 2006 (none of which starred Ms. Pollino) are the one that was performed at the Court Theater, the play in California, and the one in Vermont, in some order.
4. Neither Ms. Greer nor Ms. Pollino performed at the Regency Theater. The play at the Imperial Theater was held in a later year than the one in Rhode Island but an earlier year than at least one other performance.
5. Delores (who performed at the Court Theater) is neither Ms. Greer nor Ms. Merwald. Ms. Merwald isn't the woman who played *Medea* in Oregon (who didn't play the part in 2007).

	LAST NAME					YEAR					STATE					THEATER				
	GREER	LANASA	MERWALD	POLLINO	SPRAGG	2004	2005	2006	2007	2008	CALIFORNIA	NEW HAMPSHIRE	OREGON	RHODE ISLAND	VERMONT	COURT	IMPERIAL	PALACE	PRINCE	REGENCY
AMBER																				
DELORES																				
MELANIE																				
OLIVIA																				
SONIA																				
COURT																				
IMPERIAL																				
PALACE																				
PRINCE																				
REGENCY																				
CALIFORNIA																				
NEW HAMPSHIRE																				
OREGON																				
RHODE ISLAND																				
VERMONT																				
2004																				
2005																				
2006																				
2007																				
2008																				

FIRST NAME	LAST NAME	YEAR	STATE	THEATER

Name: \_\_\_\_\_

### Let's Learn Sudoku

Find which number is missing from each row. Fill in the empty boxes.

3	1	9	4		2	5	7	6
---	---	---	---	--	---	---	---	---

4	7	6	5	8	3		9	1
---	---	---	---	---	---	--	---	---

2	1	7	6	8	3		4	9
---	---	---	---	---	---	--	---	---

Find which number is missing from each column. Fill in the empty boxes.

2
8
9
1
5
7
4
3

9
4
3
7
2
8
6
5

6
3
5
1
8
7
2
4

6
2
7
5
1
9
3
4

3
5
7
1
8
4
9
6

Name: \_\_\_\_\_

### Let's Learn Sudoku

Find the number that is missing from each grid. Fill in the empty boxes.

1	2	3
4	5	
7	8	9

8	5	3
4	1	6
	7	9

	4	3
6	1	9
7	8	2

	2	8
5	4	9
6	3	7

2	7	3
9		5
1	6	4

1	4	5
8	9	6
2	7	

5		6
2	3	1
8	9	7

3	2	7
6	1	
4	5	8

5	4	8
1	3	2
	7	9

Name: \_\_\_\_\_

## Let's Learn Sudoku

Try this sudoku puzzle

Remember:

Each row (across) must contain the numbers 1 through 9.

Each column (up and down) must contain the numbers 1 through 9.

Each square box must contain the numbers 1 through 9.

Can you fill in the missing numbers?

1	7	5	3		6	8		9
9		4	8	5	1		7	3
6	3	8	7		4	5		1
	6	9	2	7	3	1	5	
8	5	2	1	4	9	7	3	6
3	1		5	6		2	9	
2	9	3		1	7	4	8	5
5	8	6	4		2	9		7
7		1	9	8	5	3	6	2

Name: \_\_\_\_\_

Puzzle B-2

# Kids' Sudoku

Level: You can handle it

How to play:

Each row (across) must contain the numbers 1 through 9.  
Each column (up and down) must contain the numbers 1 through 9.  
Each square box must contain the numbers 1 through 9.

		8	9	3	5		2	
	7		1	2		3	4	6
1	3	2		7			9	
2		5	8		6			7
3	9	7			1	6		4
6	8		3		7	5		2
	2			6		4	7	8
8	4	6		1	9		5	3
	5		4	8	2	1		



# Sudoku #1

2		5			7			6
4			9	6			2	
				8			4	5
9	8			7	4			
5	7		8		2		6	9
			6	3			5	7
7	5			2				
	6			5	1			2
3			4			5		8

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Fill in the blank squares so that each row, each column and each 3-by-3 block contain all of the digits 1 thru 9.

If you use logic you can solve the puzzle without guesswork.

## Sudoku #2

	6				5	7		2
		4		9	6		1	
8	7	1	3		2			
5				7	1	3		
	3			5			7	
		7	8	2				5
			5		9	6	8	7
	8		2	6		1		
7		6	4				2	

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Fill in the blank squares so that each row, each column and each 3-by-3 block contain all of the digits 1 thru 9.

If you use logic you can solve the puzzle without guesswork.

## Sudoku #3

4	7		9		1	6		5
	2		3				8	4
								1
	1	4	7		8		5	
6			2		3			9
	3		6		5	8	1	
8								
5	9				4		2	
7		1	5		2		9	8

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Fill in the blank squares so that each row, each column and each 3-by-3 block contain all of the digits 1 thru 9.

If you use logic you can solve the puzzle without guesswork.

# Sudoku #4

5				4		6	9	7
8					2		4	
		9	5		3	1		8
		1	4	3			7	
			7		9			
	7			6	5	4		
1		3	2		4	7		
	2		9					4
6	9	4		1				5

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Fill in the blank squares so that each row, each column and each 3-by-3 block contain all of the digits 1 thru 9.

If you use logic you can solve the puzzle without guesswork.

# Sudoku #5

		5	1	4				8
3		8					7	1
	1			7	8		4	
					1	8		6
	2		8		9		3	
8		7	4					
	3		5	9			8	
7	8					3		4
6				8	4	7		

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Fill in the blank squares so that each row, each column and each 3-by-3 block contain all of the digits 1 thru 9.

If you use logic you can solve the puzzle without guesswork.

## Sudoku #6

2		3		6				8
	7			5	1	3		
	5	9						
4		2	6	3			5	9
				9				
3	9			1	4	2		6
						4	2	
		1	8	4			3	
7				2		9		5

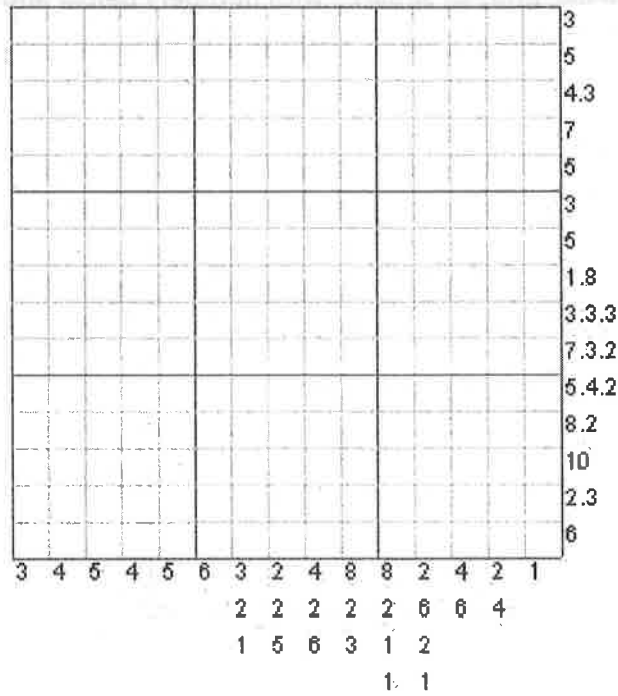
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Fill in the blank squares so that each row, each column and each 3-by-3 block contain all of the digits 1 thru 9.

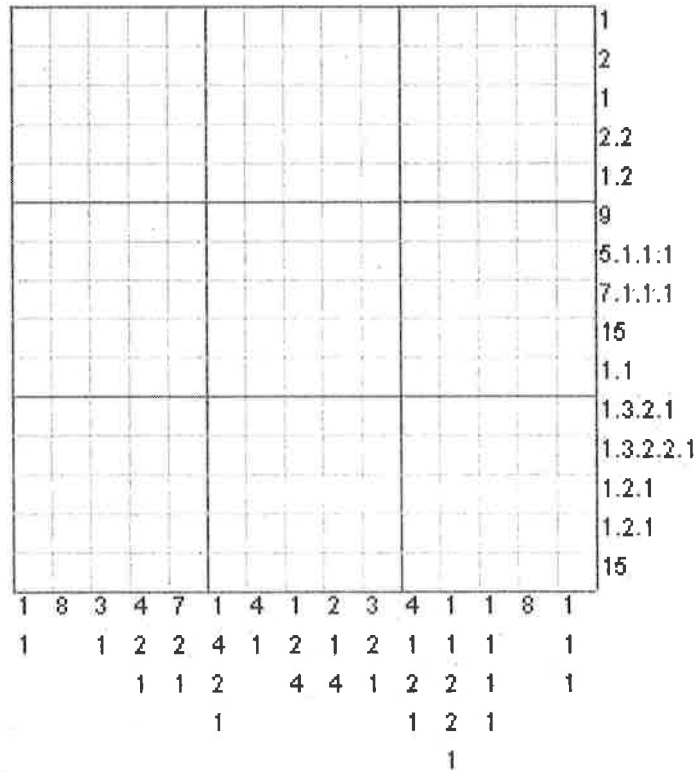
If you use logic you can solve the puzzle without guesswork.



This will Quack you up



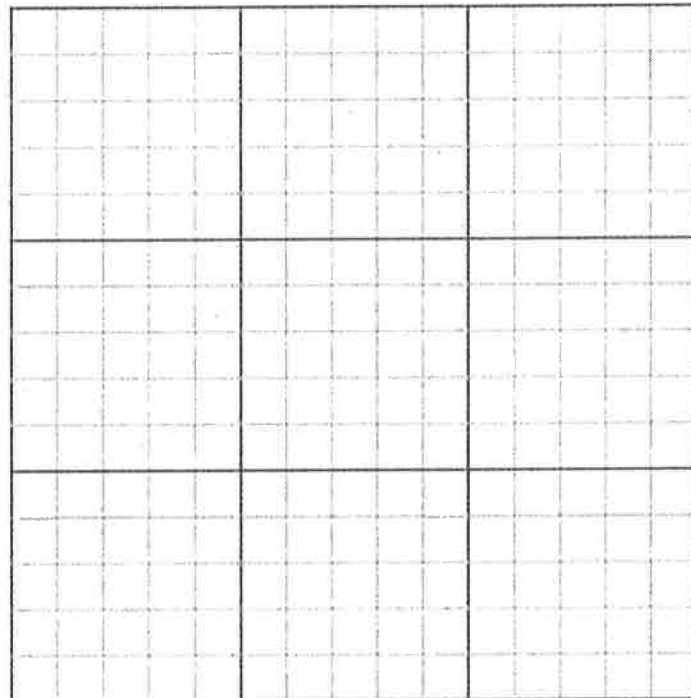
Where the heart is





PICROSS Puzzle

Puzzle Name: WHO DO YOU LOVE ?



5,2,2  
 1,4,4  
 1,9  
 1,9  
 5,7  
 5  
 3  
 1  
 0  
 2,2,1  
 2,2,1,1  
 1,1,1,4  
 1,1,1,3,1,3  
 1,2,1,1,1,1  
 1,1,3,1,1,1

1 1 5 1 1 1 3 5 6 6 6 6 6 5 3  
 1 1 2 1 1 1 1 3 1 5 1 6 1 3  
 6 2 2 6 1 1 3 1 5 1 6 1 3

Completed by: \_\_\_\_\_



# Math 9 Honours Challenge Questions

1)

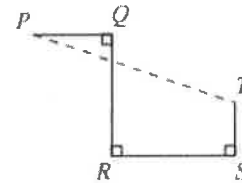
A soccer team played three games. Each game ended in a win, loss, or tie. (If a game finishes with both teams having scored the same number of goals, the game ends in a tie.) In total, the team scored more goals than were scored against them. Which of the following combinations of outcomes is not possible for this team?

- (A) 2 wins, 0 losses, 1 tie
- (B) 1 win, 2 losses, 0 ties
- (C) 0 wins, 1 loss, 2 ties
- (D) 1 win, 1 loss, 1 tie
- (E) 1 win, 0 losses, 2 ties

2)

In the diagram,  $PQ$  is perpendicular to  $QR$ ,  $QR$  is perpendicular to  $RS$ , and  $RS$  is perpendicular to  $ST$ . If  $PQ = 4$ ,  $QR = 8$ ,  $RS = 8$ , and  $ST = 3$ , then the distance from  $P$  to  $T$  is

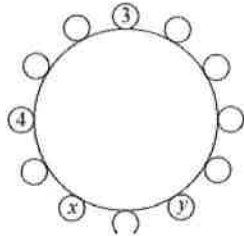
- (A) 16
- (B) 12
- (C) 17
- (D) 15
- (E) 13



3)

Each integer from 1 to 12 is to be placed around the outside of a circle so that the positive difference between any two integers next to each other is at most 2. The integers 3, 4,  $x$ , and  $y$  are placed as shown. What is the value of  $x + y$ ?

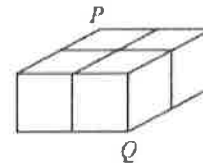
- (A) 17
- (B) 18
- (C) 19
- (D) 20
- (E) 21



4)

Grid lines are drawn on three faces of a rectangular prism, as shown. A squirrel walks from  $P$  to  $Q$  along the edges and grid lines in such a way that she is always getting closer to  $Q$  and farther away from  $P$ . How many different paths from  $P$  to  $Q$  can the squirrel take?

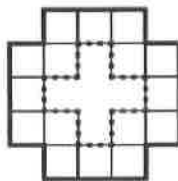
- (A) 14
- (B) 10
- (C) 20
- (D) 12
- (E) 16



5)

Sixteen squares are arranged to form a region, as shown. Each square has an area of  $400 \text{ m}^2$ . Anna walks along the path  $\text{—}$  formed by the outer edges of the region exactly once. Aaron walks along the path  $\text{---}$  formed by the inner edges of the region exactly once. In total, how far did Anna and Aaron walk?

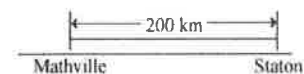
- (A) 160 m
- (B) 240 m
- (C) 320 m
- (D) 400 m
- (E) 640 m



6)

Anca and Bruce left Mathville at the same time. They drove along a straight highway towards Staton. Bruce drove at  $50 \text{ km/h}$ . Anca drove at  $60 \text{ km/h}$ , but stopped along the way to rest. They both arrived at Staton at the same time. For how long did Anca stop to rest?

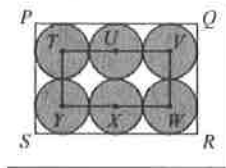
- (A) 40 minutes
- (B) 10 minutes
- (C) 67 minutes
- (D) 33 minutes
- (E) 27 minutes



# Math 9 Honours Challenge Questions

7) In the diagram, six identical circles just touch the edges of rectangle  $PQRS$  and each circle just touches the adjacent circles. The centres  $T, V, W, Y$  of four of these circles form a smaller rectangle  $TVWY$ , as shown. The centres  $U$  and  $X$  lie on this rectangle. If the perimeter of  $TVWY$  is 60, what is the area of  $PQRS$ ?

- (A) 600      (B) 900      (C) 400  
 (D) 1200      (E) 1000



8)

André has an unlimited supply of \$1 coins, \$2 coins, and \$5 bills. Using only these coins and bills and not necessarily using some of each kind, in how many different ways can he form exactly \$10?

- (A) 10      (B) 9      (C) 8      (D) 7      (E) 6

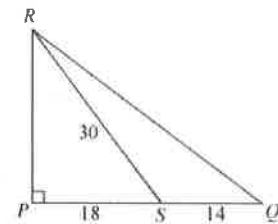
9)

If  $x = 2y$  and  $y \neq 0$ , then  $(x + 2y) - (2x + y)$  equals

- (A)  $-2y$       (B)  $-y$       (C) 0      (D)  $y$       (E)  $2y$

10) In  $\triangle PQR$ ,  $\angle RPQ = 90^\circ$  and  $S$  is on  $PQ$ . If  $SQ = 14$ ,  $SP = 18$ , and  $SR = 30$ , then the area of  $\triangle QRS$  is

- (A) 84      (B) 168      (C) 210  
 (D) 336      (E) 384



11)

In the  $4 \times 4$  grid shown, each of the four symbols has a different value. The sum of the values of the symbols in each row is given to the right of that row. What is the value of  $\spadesuit$ ?

- (A) 5      (B) 6      (C) 7  
 (D) 8      (E) 9

♥	△	△	♥	26
△	△	△	△	24
□	♠	♥	♠	27
□	♥	□	△	33

12)

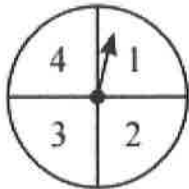
How many pairs of positive integers  $(x, y)$  have the property that the ratio  $x : 4$  equals the ratio  $9 : y$ ?

- (A) 6      (B) 7      (C) 8      (D) 9      (E) 10

## Math 9 Honours Challenge Questions

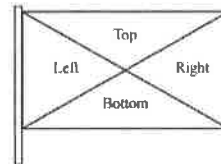
- 13) On each spin of the spinner shown, the arrow is equally likely to stop on any one of the four numbers. Deanna spins the arrow on the spinner twice. She multiplies together the two numbers on which the arrow stops. Which product is most likely to occur?

(A) 2      (B) 4      (C) 6  
(D) 8      (E) 12



- 14) A rectangular flag is divided into four triangles, labelled Left, Right, Top, and Bottom, as shown. Each triangle is to be coloured one of red, white, blue, green, and purple so that no two triangles that share an edge are the same colour. How many different flags can be made?

(A) 180      (B) 200      (C) 220  
(D) 240      (E) 260



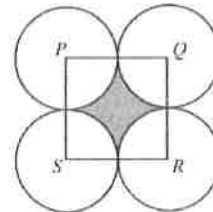
- 15)

If  $4^n = 64^2$ , then  $n$  equals

(A) 3      (B) 5      (C) 6      (D) 8      (E) 12

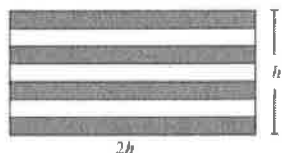
- 16) In the diagram,  $PQRS$  is a square with side length 2. Each of  $P$ ,  $Q$ ,  $R$ , and  $S$  is the centre of a circle with radius 1. What is the area of the shaded region?

(A)  $16 - \pi^2$       (B)  $16 - 4\pi$       (C)  $4 - 4\pi$   
(D)  $4 - 4\pi^2$       (E)  $4 - \pi$



- 17) The rectangular flag shown is divided into seven stripes of equal height. The height of the flag is  $h$  and the length of the flag is twice its height. The total area of the four shaded regions is  $1400 \text{ cm}^2$ . What is the height of the flag?

(A) 70 cm      (B) 200 cm      (C) 35 cm  
(D) 1225 cm      (E) 14 cm



- 18)

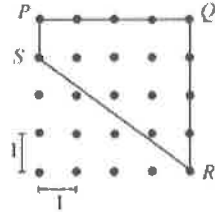
Sam rolls a fair four-sided die containing the numbers 1, 2, 3, and 4. Tyler rolls a fair six-sided die containing the numbers 1, 2, 3, 4, 5, and 6. What is the probability that Sam rolls a larger number than Tyler?

(A)  $\frac{1}{6}$       (B)  $\frac{5}{12}$       (C)  $\frac{3}{8}$       (D)  $\frac{3}{4}$       (E)  $\frac{1}{4}$

# Math 9 Honours Challenge Questions

19) In the diagram, the horizontal distance between adjacent dots in the same row is 1. Also, the vertical distance between adjacent dots in the same column is 1. What is the perimeter of quadrilateral  $PQRS$ ?

- (A) 12      (B) 13      (C) 14  
(D) 15      (E) 16



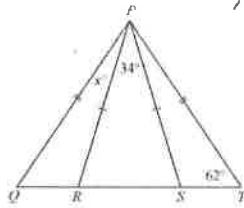
20)

A hockey team has 6 more red helmets than blue helmets. The ratio of red helmets to blue helmets is 5 : 3. The total number of red helmets and blue helmets is

- (A) 16      (B) 18      (C) 24      (D) 30      (E) 32

21) In the diagram, points  $R$  and  $S$  lie on  $QT$ . Also,  $\angle PTQ = 62^\circ$ ,  $\angle RPS = 34^\circ$ , and  $\angle QPR = x^\circ$ . What is the value of  $x$ ?

- (A) 11      (B) 28      (C) 17  
(D) 31      (E) 34



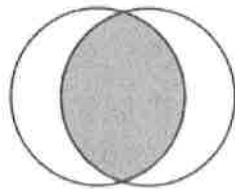
22)

A string has been cut into 4 pieces, all of different lengths. The length of each piece is 2 times the length of the next smaller piece. What fraction of the original string is the longest piece?

- (A)  $\frac{8}{13}$       (B)  $\frac{2}{5}$       (C)  $\frac{1}{2}$       (D)  $\frac{6}{13}$       (E)  $\frac{1}{4}$

23) Two circles with equal radii intersect as shown. The area of the shaded region equals the sum of the areas of the two unshaded regions. If the area of the shaded region is  $216\pi$ , what is the circumference of each circle?

- (A)  $18\pi$       (B)  $27\pi$       (C)  $36\pi$   
(D)  $108\pi$       (E)  $324\pi$



24) In the diagram, there are 26 levels, labelled  $A, B, C, \dots, Z$ . There is one dot on level  $A$ . Each of levels  $B, D, F, H, J, \dots$ , and  $Z$  contains twice as many dots as the level immediately above. Each of levels  $C, E, G, I, K, \dots$ , and  $Y$  contains the same number of dots as the level immediately above. How many dots does level  $Z$  contain?

- (A) 1024      (B) 2048      (C) 4096  
(D) 8192      (E) 16384

