9	M	E	4	(	Q	)

Education Bureau

Territory-wide System Assessment 2011

Secondary 3

Mathematics

QUESTION BOOKLET

INSTRUCTIONS

1. There are 52 questions in this paper.
2. The time allowed is 65 minutes.
3. Answer ALL questions in the separate ANSWER BOOKLET.
4. The use of HKEAA approved calculators is permitted.
5. Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures.
6. Rough work should be done on the rough work sheet provided.
7. The diagrams in this paper are not necessarily drawn to scale.

FORMULAS FOR REFERENCE

Sector	Arc length	=	$2\pi r \times \frac{\theta}{360^\circ}$
	Area	=	$\pi r^2 \times \frac{\theta}{360^\circ}$
Sphere	Surface area	=	$4\pi r^2$
	Volume	=	$\frac{4}{3}\pi r^3$
Cylinder	Curved surface area	=	$2\pi rh$
	Volume	=	$\pi r^2 h$
Cone	Curved surface area	=	πrl
	Volume	=	$\frac{1}{3}\pi r^2 h$
Prism	Volume	=	base area × height
Pyramid	Volume	=	$\frac{1}{3}$ × base area × height

SECTION A: Choose the best answer for each question.
You should mark all your answers in the ANSWER BOOKLET.

1. $4.57 \times 10^6 =$

A. 457 000.
B. 4 570 000.
C. 45 700 000.
D. 457 000 000.

2. Of the students at Kai Shing Secondary School, there are 500 boys. The number of girls is greater than number of boys by 200.
Find the ratio of number of girls to total number of students in that school.

A. 7 : 12
B. 5 : 12
C. 2 : 7
D. 2 : 5

3. $4 + (-x)^2 =$

A. $4 + x^2$.
B. $4 - x^2$.
C. $4x^2$.
D. $4 + 2x$.

4. Which of the following is a polynomial?

A. $3x^2$
B. $3^x - 5x + 2$
C. $\sqrt{3x^2 + 4x - 5}$
D. $\frac{2}{x} + 7$

5. Which of the following polynomials is in ascending powers of x?

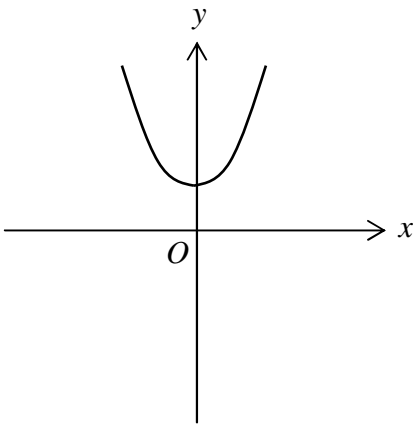
A. $x^3 + 2x + 3x^2 + 4$
B. $x^3 + 3x^2 + 2x + 4$
C. $4 + 3x^2 + 2x + x^3$
D. $4 + 2x + 3x^2 + x^3$

6. $2^{-5} =$

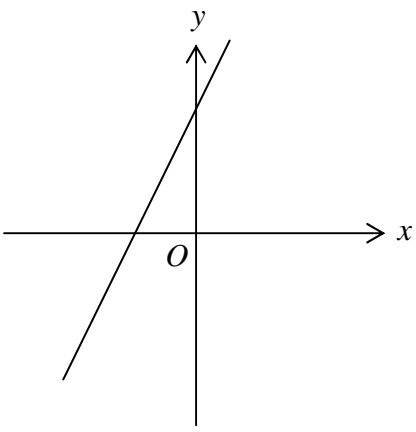
A. -10.
B. $\frac{1}{10}$.
C. -32.
D. $\frac{1}{32}$.

7. Which of the following may represent the graph of the equation $2x - y + 4 = 0$?

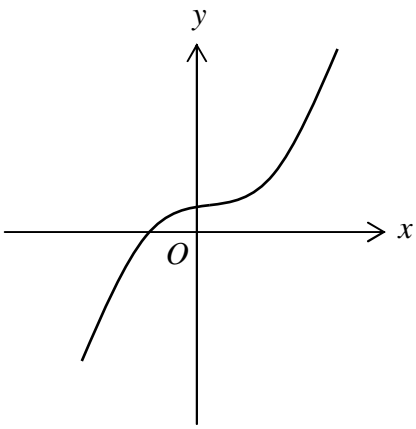
A.



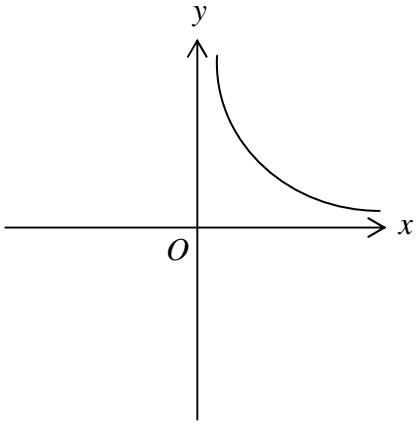
B.



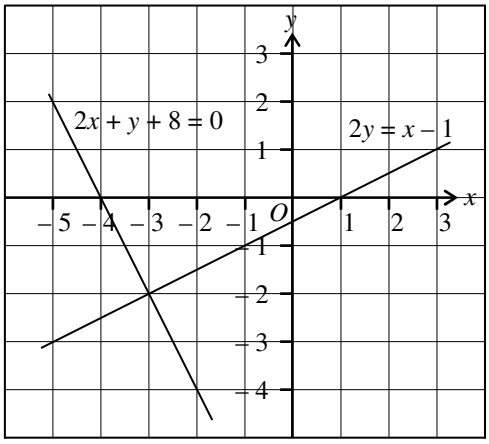
C.



D.



8.

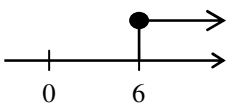


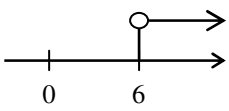
The figure shows the graphs of $2x + y + 8 = 0$ and $2y = x - 1$.

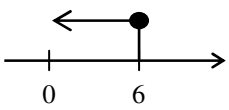
Solve $\begin{cases} 2x + y + 8 = 0 \\ 2y = x - 1 \end{cases}$ graphically.

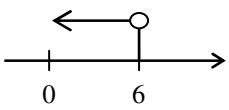
A. (1 , 0)
B. (–4 , 0)
C. (–3 , –2)
D. (–2 , –3)

9. Which of the following diagrams represents $x \leq 6$?

A.


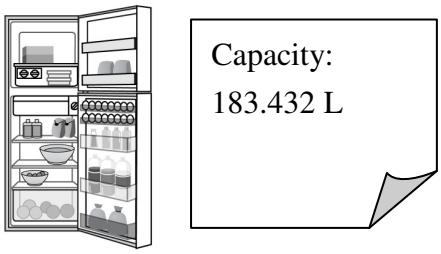
B.


C.


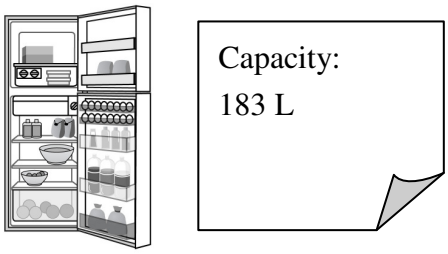
D.


10. The capacity of a refrigerator is shown in each of the following advertisements. Which measurement is expressed in the most appropriate unit and degree of accuracy?

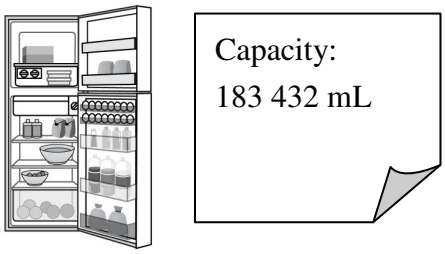
A.



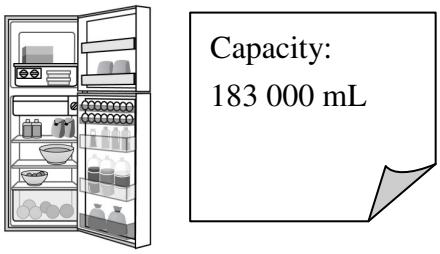
B.



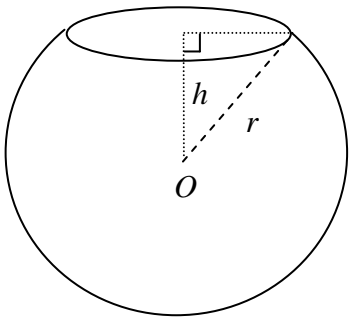
C.



D.



11.



The figure shows a fish bowl which is in the shape of a sphere with a portion being cut out. The radius of the sphere is r and the centre of the sphere is O. The depth of the bowl is $r + h$. By considering the **dimensions**, determine which of the following could be the formula of the capacity of the bowl?

A. $2\pi r(h + r)$

B. $2\pi(r+h)\sqrt{r^2 - h^2}$

C. $2\pi\left(r + \sqrt{r^2 - h^2}\right)$

D. $\frac{\pi}{3}(h^3 + r^2h + 2r^3)$

12. Figure *P* is changed to Figure *Q* after a single transformation. The transformation is

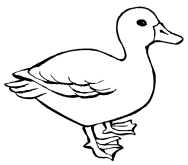


Figure *P*

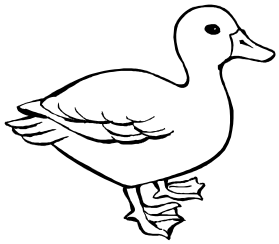
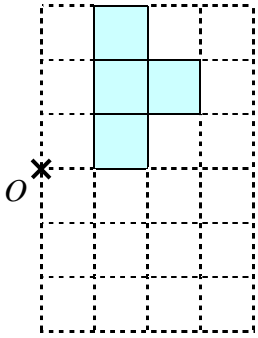


Figure *Q*

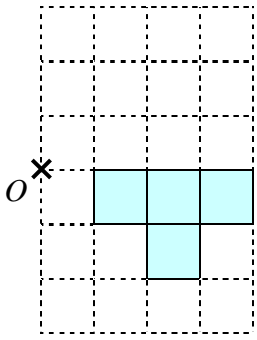
A. rotation.
B. enlargement.
C. translation.
D. reflection.

13.

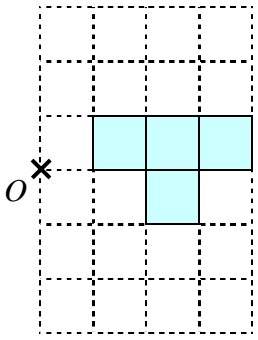


The above figure is rotated about *O* through 90° in clockwise direction, which of the following will be the resulting image of the rotation?

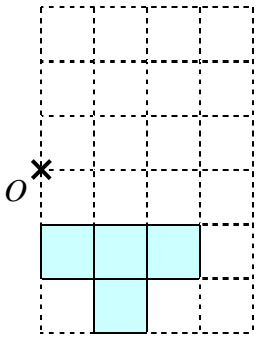
A.



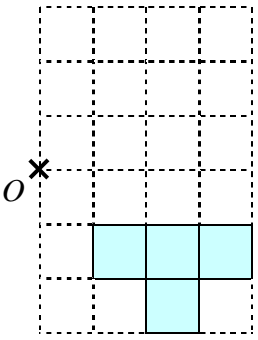
B.



C.

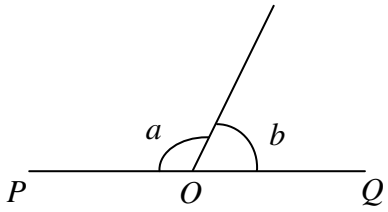


D.



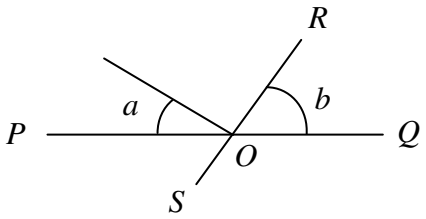
14. Which of the following figures shows that a and b are vertically opposite angles?

A.



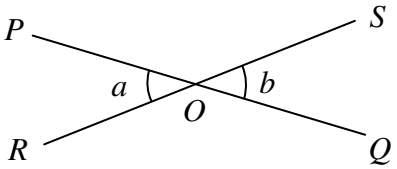
POQ is a straight line

B.



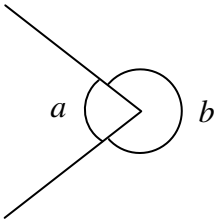
POQ and *ROS* are straight lines

C.

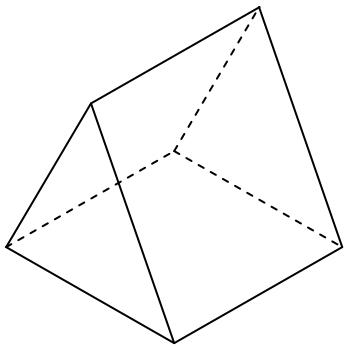


POQ and *ROS* are straight lines

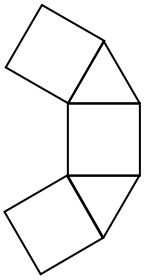
D.



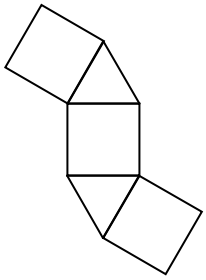
15. Which of the following nets **CANNOT** be folded into a triangular prism?



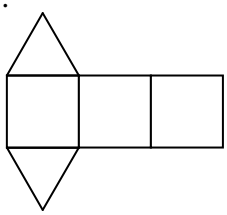
A.



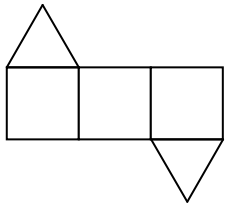
B.



C.

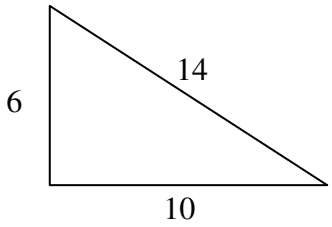


D.

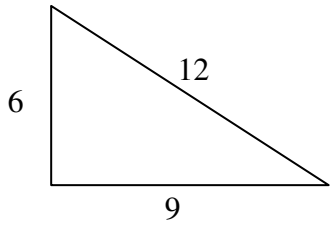


16. Which of the following is a right-angled triangle?

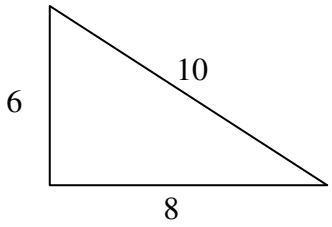
A.



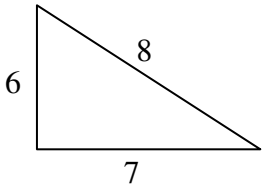
B.



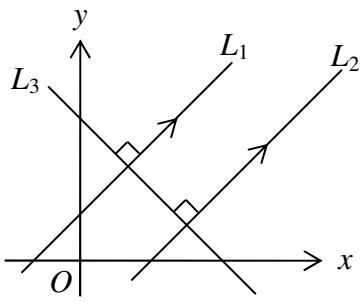
C.



D.



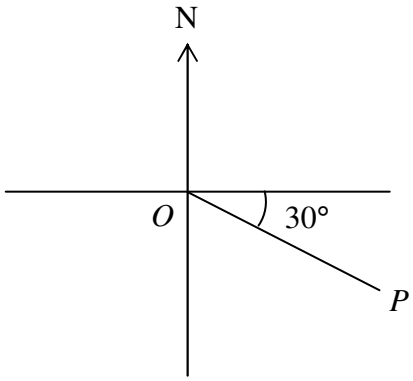
17. In the figure, the line L_3 is perpendicular to a pair of parallel lines $L_1$and L_2.



Which of the following may be the slopes of L_1, L_2 and L_3?

	Slope of L_1	Slope of L_2	Slope of L_3
A.	−1	−1	1
B.	1	−1	1
C.	−1	1	−1
D.	1	1	−1

18. Refer to the figure, find the true bearing of O from P.

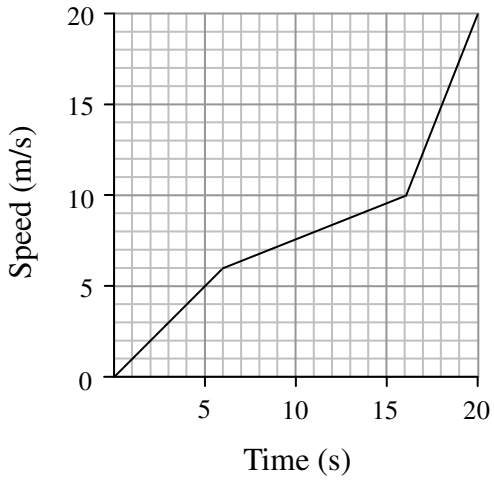


A. 030°
B. 060°
C. 120°
D. 300°

19. Which of the following data is continuous?

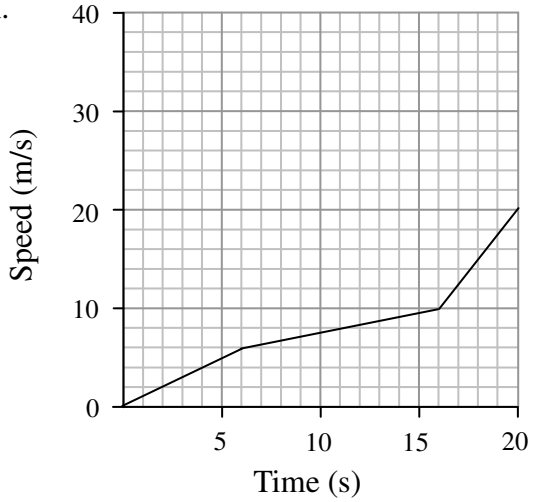
A. The number of compact discs in a drawer
B. The weight of a steak
C. The number of passengers in a bus
D. The number on a restaurant queue ticket

20. Carmen used the same data set to draw two broken line graphs. One of them is shown as follows:

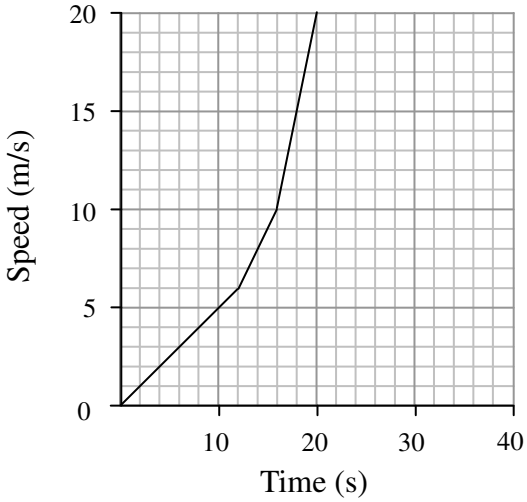


Which of the following is most likely another broken line graph?

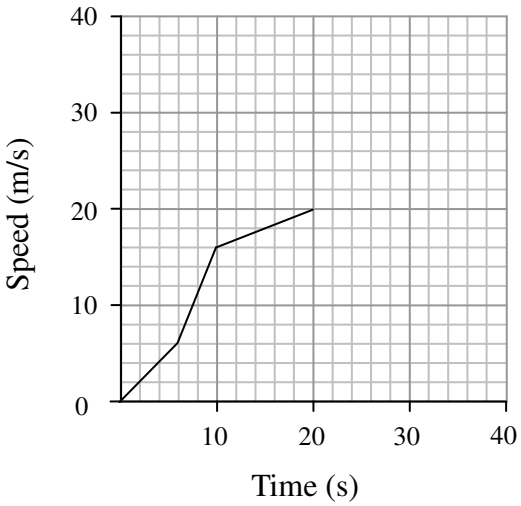
A.



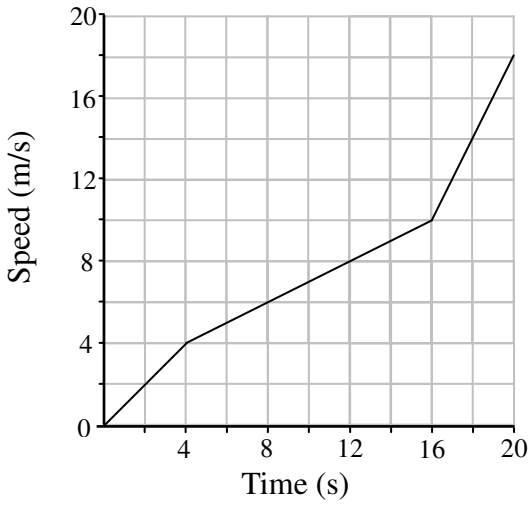
B.



C.



D.

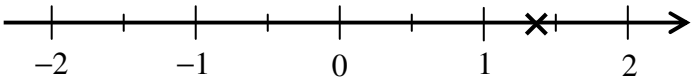


SECTION B: Write ALL the answers in the ANSWER BOOKLET.
Working need not be shown.

21. Calculate $\dfrac{2(-4)}{2+(-4)}$.

22. Round off 17.863 5 to 3 significant figures.

23. Use the symbol '×' to mark the number $-\sqrt{5}$ on the number line given in the **ANSWER BOOKLET**.
Example: $\sqrt{2}$ is marked on the number line below.



24. Determine whether a rate or a ratio should be used to relate the quantities in each of the following statements.

(i) A machine produces 90 cans of soft drinks hourly.
(ii) The weight of David is twice the weight of May.

25. S ° is the sum of all interior angles of an n-sided polygon. S can be calculated by the following formula

$$S = (n-2)\times 180 .$$

If S = 2 880, find the value of n.

26. Find the values of x and y in the following arithmetic sequence.

$$7, -2, -11, -20, x, y, \ldots$$

27. The n^{th} term of a sequence is $2-\dfrac{n}{2}$. Find the value of the 5^{th} term of the sequence.

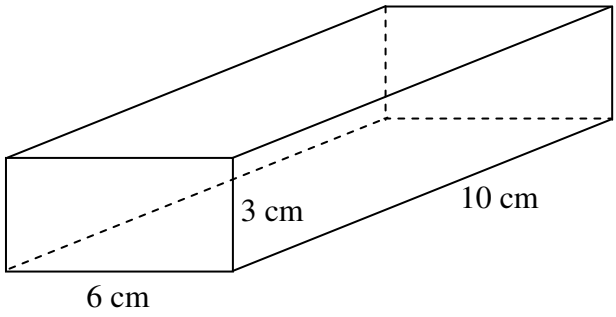
28. Simplify $(x^2+4x)+(x-4x^2)$.

29. Factorize $9x^2 + 12x + 4$.

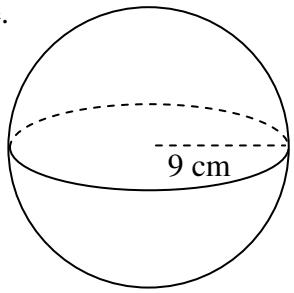
30. Solve $3 - \frac{x}{2} = x$.

31. Solve the inequality $5x - 2 < 18$.

32. The length, width and height of a solid cuboid are 10 cm, 6 cm and 3 cm respectively. Find the total surface area of the cuboid.



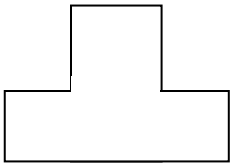
33. The figure shows a sphere of radius 9 cm. Find the volume of the sphere. Correct the answer to the nearest cm^3.



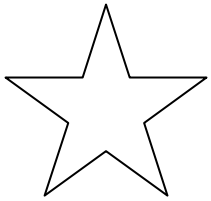
34. Which of the following are **NOT** concave polygons? (May be more than one answer)

A.

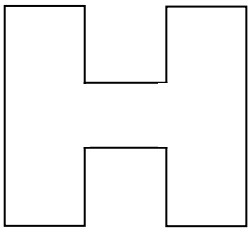
B.



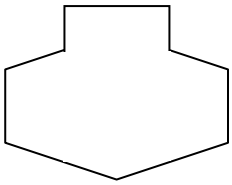
C.



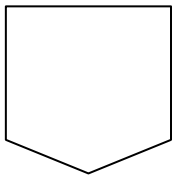
D.



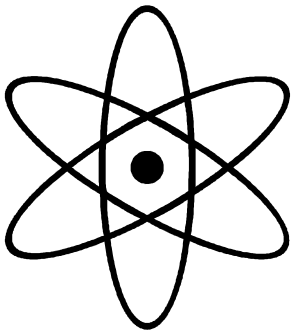
E.



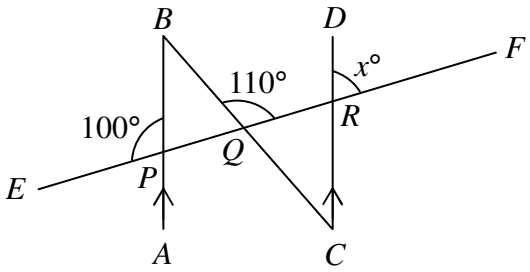
F.



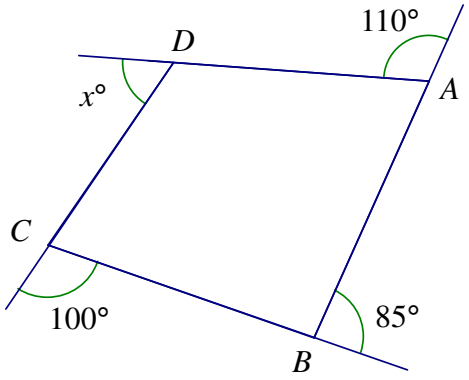
35. The figure on the right has rotational symmetry. Find its order of rotational symmetry.



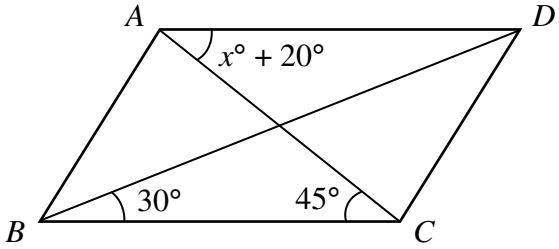
36. In the figure, APB, BQC, CRD and $EPQRF$ are straight lines, $AB \parallel CD$, $\angle BPE = 100°$ and $\angle BQR = 110°$. Find the value of x.



37. The figure shows a quadrilateral $ABCD$. Find the value of x.

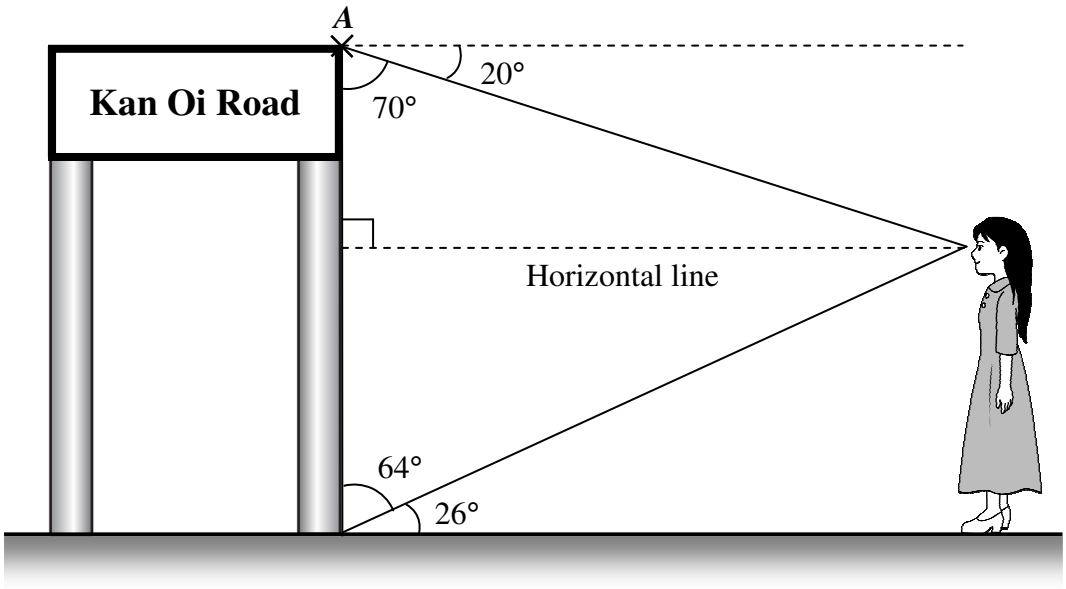


38. In the figure, $ABCD$ is a parallelogram. Find the value of x.



39. $A(7\ ,\ -2)$ and $B(-3\ ,\ 5)$ are two points on straight line L in the rectangular coordinate plane. Find the slope of L.

40. In the figure, the __(1)__ of point A from the girl is __(2)__ .



41. The inflation rates (%) of a city in 8 consecutive years are as follows:

6, 3, 2, 1, 1, 3, 6, 6

Find the arithmetic mean and median of the above data.

42. The following table shows the weights (kg) of 50 newborn babies.

Weight (kg)	1.5 — 2.4	2.5 — 3.4	3.5 — 4.4	4.5 — 5.4
Frequency	3	20	22	5

Find the modal class of the weights of these 50 newborn babies.

43. There are 2 bags. Each bag contains one black ball and one white ball. If one ball is drawn from each bag at random, find the probability of getting 2 black balls.

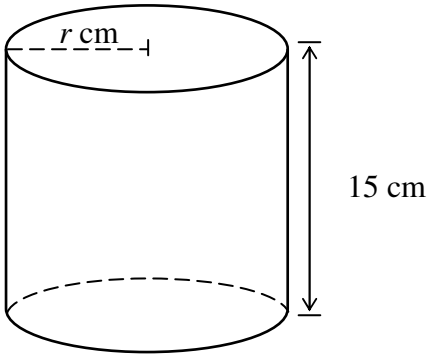
SECTION C: All working must be clearly shown.
Write the mathematical expressions, answers and statements/conclusions in the spaces provided in the ANSWER BOOKLET.

44. Joseph bought a model car for \$80 and then sold it at a profit of 60%. Find the selling price of the model car.

45. The annual car sales of WIND Motor were 45 000 vehicles in 2010. If the annual car sales are expected to increase by 10% each year, find the expected annual car sales of WIND Motor in 2013.

46. Solve the simultaneous equations $\begin{cases} 2x+5y=18 \\ 2x-3y=2 \end{cases}$.

47. The figure shows a cylindrical can. Its height is 15 cm and its volume is $240\pi \text{ cm}^3$. The base radius of the can is r cm. Find the value of r.

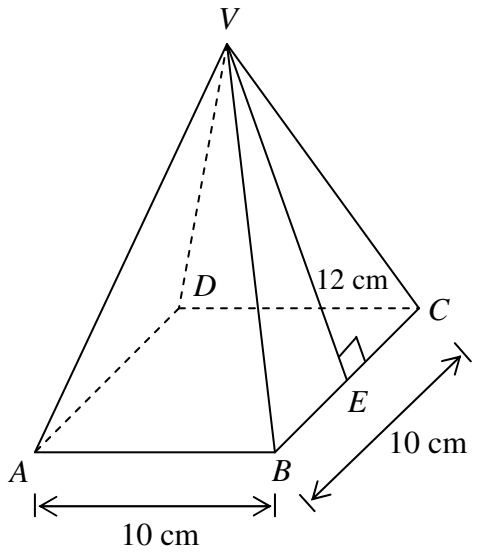


48. Complete the table for the equation $y-3=0$ in the **ANSWER BOOKLET**.

x	-2	0	2
y		3	

According to the table, draw the graph of this equation on the rectangular coordinate plane given in the **ANSWER BOOKLET**.

49. In the figure, $VABCD$ is a solid right pyramid. $ABCD$ is a square of side length 10 cm. The height of $\triangle VBC$ is 12 cm. Find the total surface area of the pyramid.



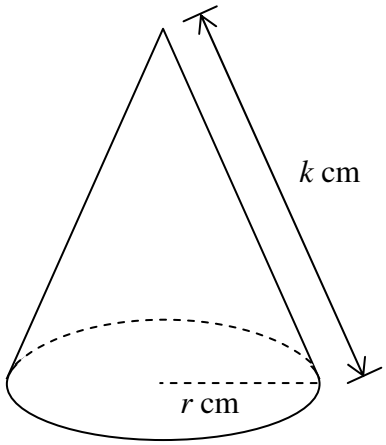
50. A cm^2 is the total surface area of a cone. A can be calculated by the following formula

$$A = \pi r(k + r),$$

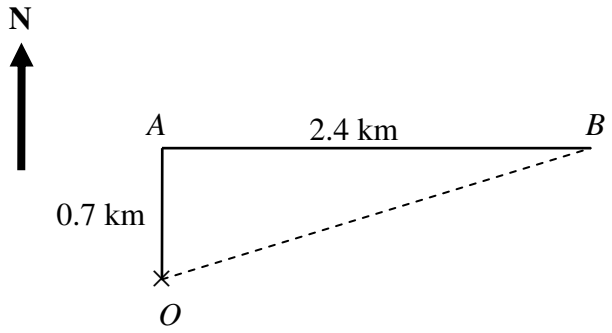
where r cm and k cm represent the base radius and the slant height of the cone respectively.

(a) Make k the subject of the formula.

(b) If $A = 90\pi$ and $r = 5$, find the value of k.



51. At point O, a man starts walking due north for 0.7 km to point A and then walks due east for 2.4 km to point B. Find the distance between point O and point B.



52. A charitable organization received donations from 15 donors. The donations are listed below.

\$20	\$20	\$40	\$50	\$50
\$50	\$70	\$80	\$10	\$20
\$1 500	\$50	\$90	\$40	\$1 000

Mary said that the arithmetic mean of the donations is \$206 and so most of these 15 donors donated more than \$200.

Do you agree with Mary's claim? Explain your answer.

END OF PAPER

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