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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	$= 2\pi r h$
	Volume	$= \pi r^2 h$
Cone	Curved surface area	$= \pi r l$
	Volume	$= \frac{1}{3}\pi r^2 h$
Prism	Volume	$= \text{base area} \times \text{height}$
Pyramid	Volume	$= \frac{1}{3} \times \text{base area} \times \text{height}$

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

- Which of the following is correct?
 - $\sqrt{121} < 11 < \sqrt{123}$
 - $\sqrt{142} < 12 < \sqrt{144}$
 - $\sqrt{168} < 13 < \sqrt{170}$
 - $\sqrt{193} < 14 < \sqrt{195}$

- After rounding off a number to 3 significant figures, the value obtained is 0.100. The number may be
 - 0.099 53.
 - 0.099 9.
 - 0.099 95.
 - 0.100 5.

- Which of the following objects is the fastest?
 - Object A: the speed is 18 m/s
 - Object B: the speed is 700 m/min
 - Object C: the speed is 8 000 m/h
 - Object D: the speed is 50 km/h

- A box of colour pens is distributed to 5 children. Each child gets x pens. There are 3 pens left. Find the number of colour pens in the box.
 - $5x + 3$
 - $5x - 3$
 - $5(x - 3)$
 - $5(x + 3)$

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. If $a > 1$, which of the following **MUST** be correct?

A. $\frac{a^6}{a^2} = a^3$

B. $(a^2)^6 = a^{12}$

C. $a^3 \times a^4 = a^{12}$

D. $(a^3)^0 = 0$

7. The equations $2x = 8$ and $x + k = 10$ have the same root, where k is a constant. Find the value of k .

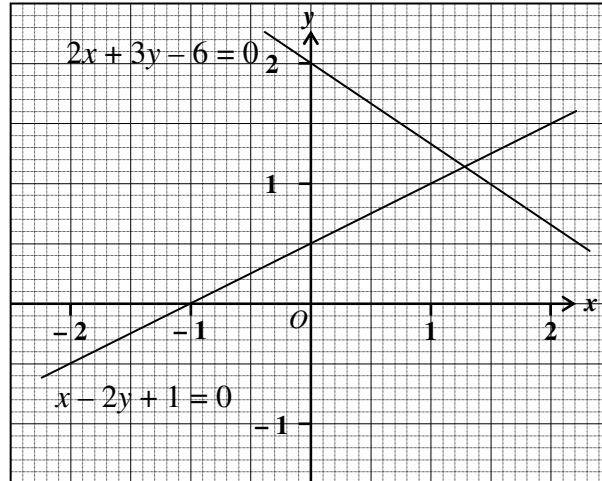
A. 4

B. 6

C. 12

D. 14

8.



The figure shows the graphs of $2x + 3y - 6 = 0$ and $x - 2y + 1 = 0$.

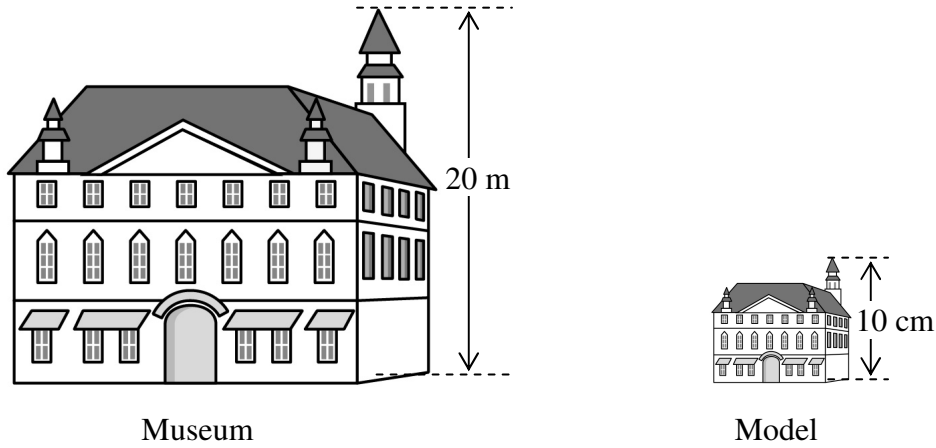
Solve $\begin{cases} 2x + 3y - 6 = 0 \\ x - 2y + 1 = 0 \end{cases}$ graphically.

- A. The approximate solution is $(1.3, 1.1)$.
- B. The approximate solution is $(1.5, 1.5)$.
- C. The exact solution is $(1.3, 1.1)$.
- D. The exact solution is $(1.5, 1.5)$.

9. The area of a rectangle is $x \text{ cm}^2$, the width is 4 cm and the length is not less than 7 cm. Which of the following inequalities can be used to find the range of x ?

- A. $\frac{x}{4} < 7$
- B. $\frac{x}{4} \leq 7$
- C. $\frac{x}{4} > 7$
- D. $\frac{x}{4} \geq 7$

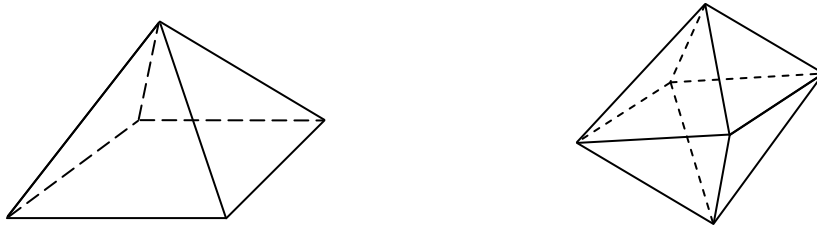
10.



In the figure, the museum is similar to its model. The height of the museum is 20 m and the height of the model is 10 cm. The ground floor of the museum covers an area of 800 m^2 . What is the base area of the model?

- A. 100 cm^2
- B. 200 cm^2
- C. 400 cm^2
- D. $1\,600 \text{ cm}^2$

11. The figure shows two solids *I* and *II*. In each solid, the lengths of **ALL** edges are equal.



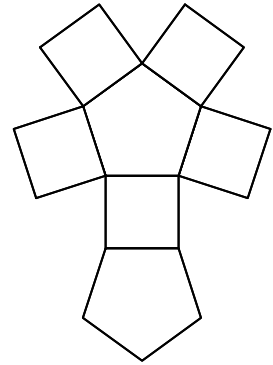
Solid *I*

Solid *II*

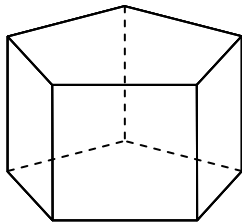
Which of the following statements is correct?

- | <u>Solid <i>I</i></u> | <u>Solid <i>II</i></u> |
|---|--|
| A. It is a regular polyhedron. | It is a regular polyhedron. |
| B. It is a regular polyhedron. | It is NOT a regular polyhedron. |
| C. It is NOT a regular polyhedron. | It is a regular polyhedron. |
| D. It is NOT a regular polyhedron. | It is NOT a regular polyhedron. |

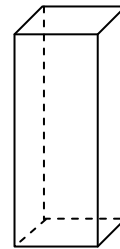
12. Which of the following 3-D figures can be made by the net on the right?



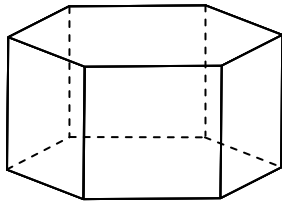
A.



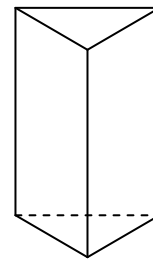
B.



C.



D.



13. Figure X is changed to Figure Y after a single transformation.



Figure X



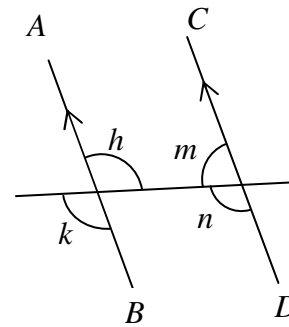
Figure Y

The transformation is

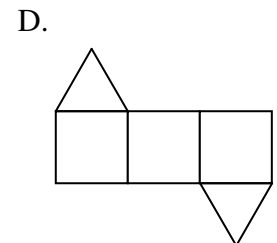
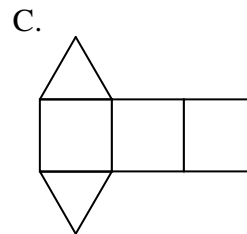
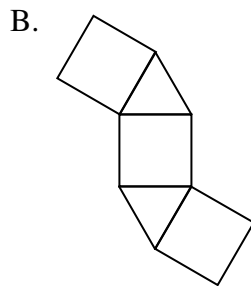
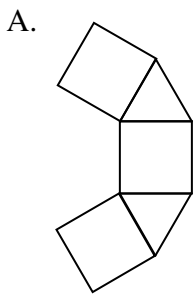
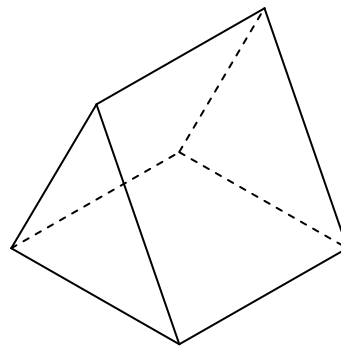
- A. rotation.
- B. reflection.
- C. enlargement.
- D. translation.

14. In the figure, $AB \parallel CD$. Which of the following is a pair of alternate angles?

- A. h and m
- B. h and k
- C. k and n
- D. h and n

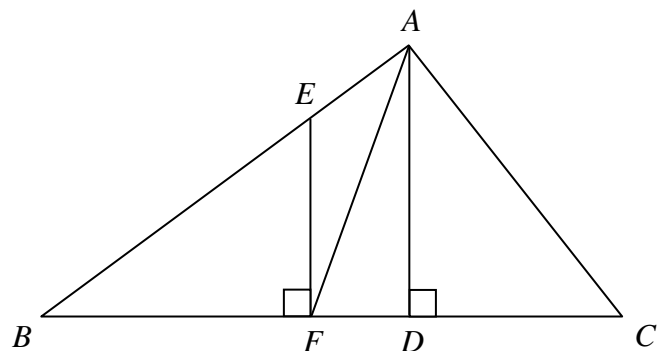


15. Which of the following nets **CANNOT** be folded into a triangular prism?



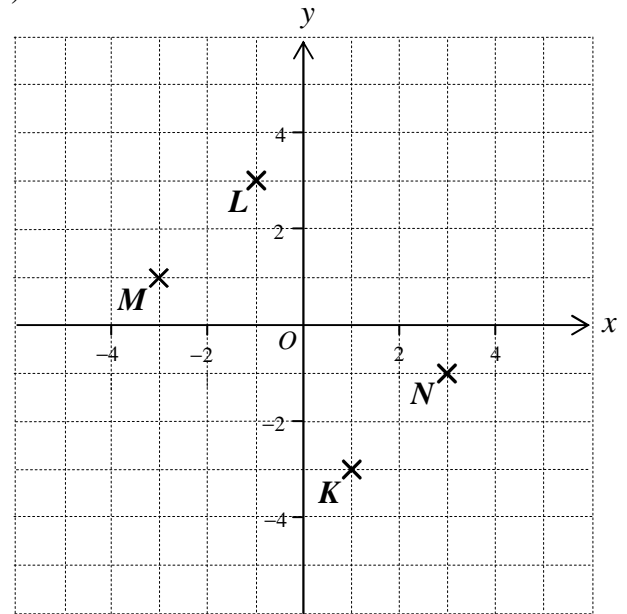
16. In $\triangle ABC$, $BF = FC$, $EF \perp BC$ and $AD \perp BC$. AD is

- A. a perpendicular bisector of $\triangle ABC$.
- B. a median of $\triangle ABC$.
- C. an angle bisector of $\triangle ABC$.
- D. an altitude of $\triangle ABC$.



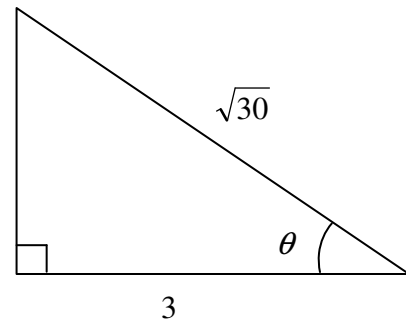
17. In the figure, which point can be represented by $(3, -1)$?

- A. *K*
- B. *L*
- C. *M*
- D. *N*



18. In the figure, find θ . (Correct to the nearest degree)

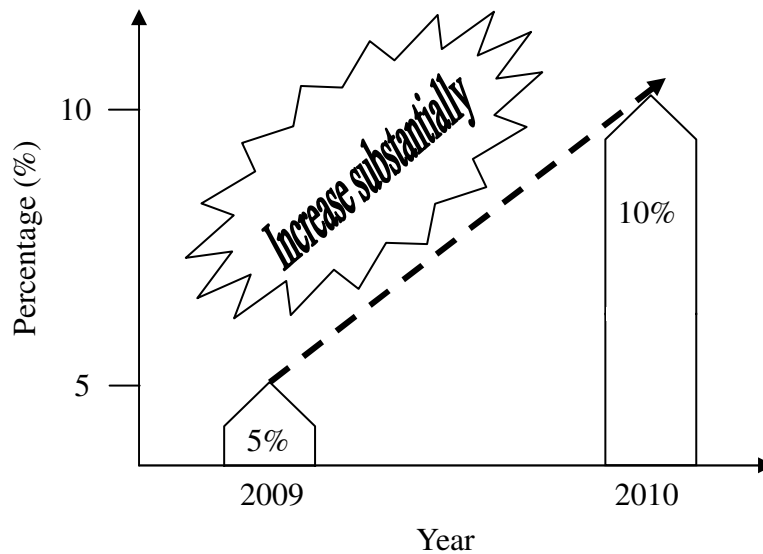
- A. 29°
- B. 33°
- C. 57°
- D. 61°



19. Fanny needs to collect the statistics on incoming visitors to Hong Kong in 2006 – 2007, 2007 – 2008, and 2008 – 2009. Which of the following is the most suitable method?

- A. Observe and record the number of incoming visitors at the airport, piers and railway stations.
- B. Search information from the webpage of Immigration Department.
- C. Interview the tour guides from travel agencies.
- D. Give questionnaires to the visitors.

20. An advertisement for a private tuition institute uses the following graph to show the percentage of students who got 'A' grade in the 2009 and 2010 Mathematics Public Examinations.

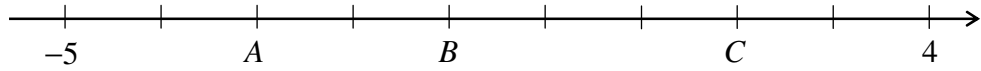


Which of the following statements is the best explanation as to why readers could be misled by the advertisement?

- A. The numbers of hours that students took tutorial classes are not shown.
- B. The results in other years are not compared.
- C. The vertical scale does not start from zero.
- D. The percentage of students who failed the examinations is not shown.

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

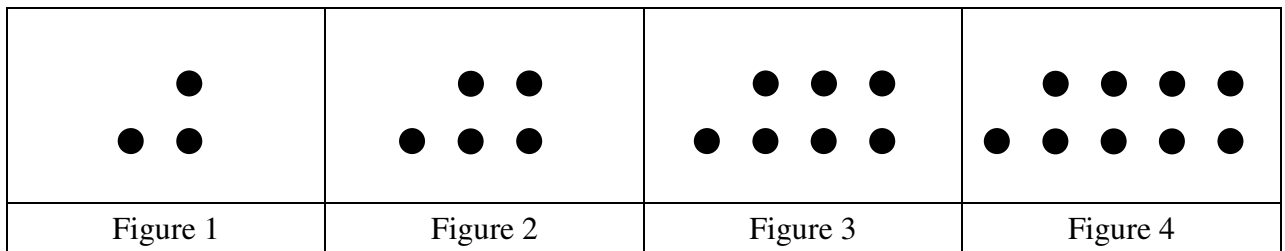
21. Write down the numbers represented by A , B and C on the number line below.



22. Jackson deposited \$4 000 in a bank. The simple interest rate was 2% p.a. Find the amount received after 4 years.

23. The diameter of the cross-section of an optical fibre is about 0.000 065 m. Use scientific notation to represent this number.

24. Kenny used dots to form the following figures:



According to the above pattern, how many dots form Figure n ?

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

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

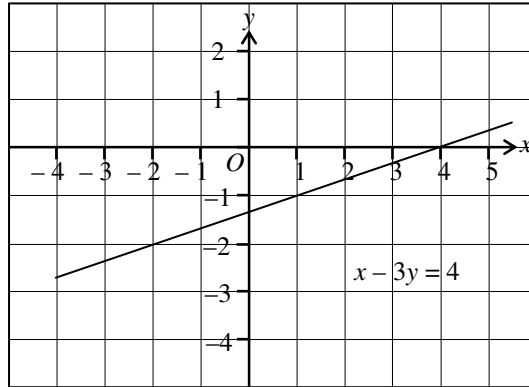
If $S = 2\,880$, find the value of n .

26. Expand $-2x(-3x + 6y)$.

27. When $(x - 1)(2x - 1)(3x + 2)$ is expanded, the result is $6x^3 - 5x^2 - 3x + 2$.

What is the result when $6x^3 - 5x^2 - 3x + 2$ is factorized?

28.



The above figure shows the graph of $x - 3y = 4$. Which of the following points lie(s) on the graph? (May be more than one answer)

$E(-4, -3)$, $F(-1, -\frac{4}{3})$, $G(2, -\frac{2}{3})$, $H(4, 0)$

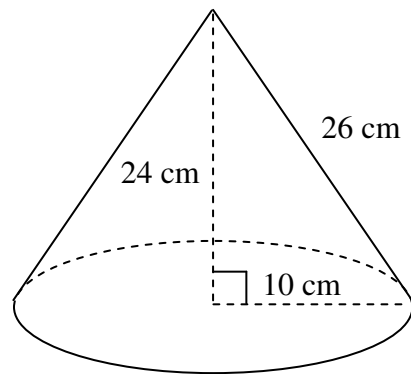
29. Expand $(3x + 5)^2$.

30. Given the formula $2S = n[2a + (n - 1)d]$.

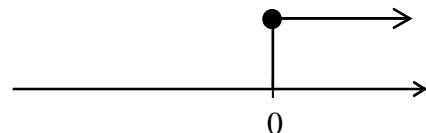
If $S = 210$, $d = 4$ and $n = 10$, find the value of a .

31. The figure shows a right circular cone of base radius 10 cm and height 24 cm.

Its slant height is 26 cm. Find the curved surface area of the cone in terms of π .



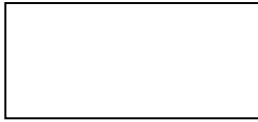
32. According to the diagram, write down an inequality in x .



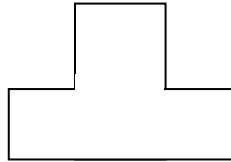
33. The area of a circle is $36\pi \text{ cm}^2$. Find its radius.

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

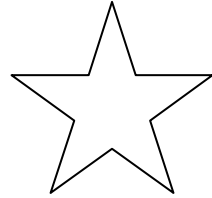
A.



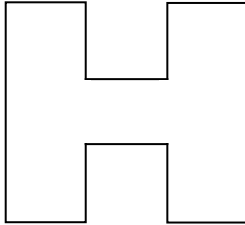
B.



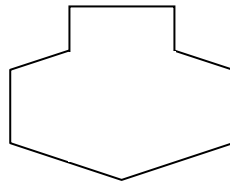
C.



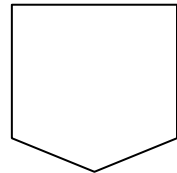
D.



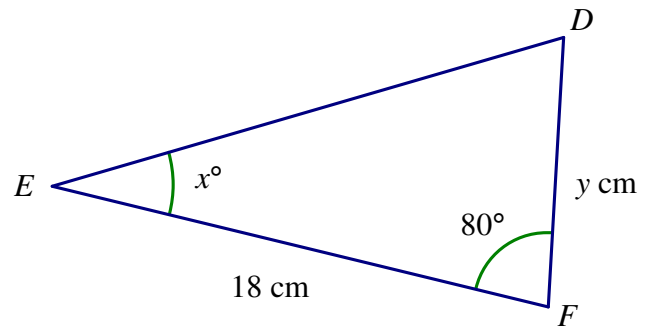
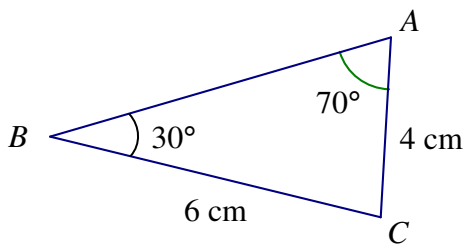
E.



F.



35.

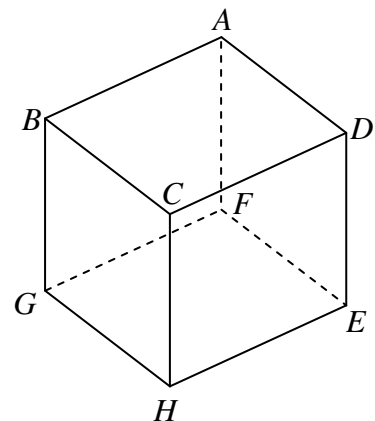


In the figure, $\triangle ABC \sim \triangle DEF$. Find

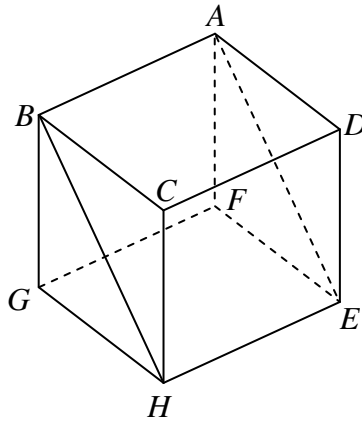
- (a) the value of x ,
- (b) the value of y .

36. The figure shows a cube $ABCDEFGH$.

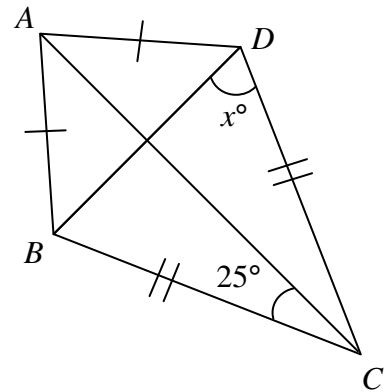
Name **ONE** of the axes of rotational symmetry containing vertex B .



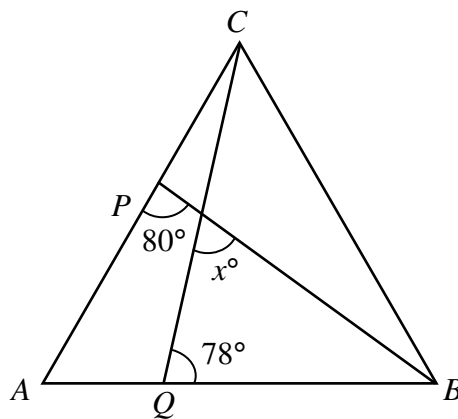
37. $ABCDEFGH$ is a cuboid. Name the angle between the inclined plane $ABHE$ and the horizontal plane $ABCD$.



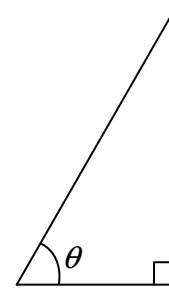
38. In the figure, $ABCD$ is a kite where $AB = AD$ and $BC = DC$. Find the value of x .



39. In the figure, $\triangle ABC$ is an equilateral triangle. P and Q are points on AC and AB respectively such that $\angle CQB = 78^\circ$ and $\angle APB = 80^\circ$. Find the value of x .



40. In the figure, $\sin \theta = 0.92$. Find θ . (Correct to the nearest 0.1°)



41. David took part in an interview for a job. The following table shows the marking criteria in the interview and the marks that David got.

Marking items				
	Working Experiences	Related Qualifications	Language Proficiency	Analytic Skill
Weight	3	2	3	2
Marks	19	16	18	11

Find the weighted mean mark that David got.

42. Connie is doing a survey to analyze her classmates' participation in extra-curricular activities in this academic year. The survey is conducted in the following four stages.

Arrange these stages in correct order. For example: (1) \rightarrow (2) \rightarrow (3) \rightarrow (4)

- (1) Analyze graphs and data to reach conclusions.
- (2) Organize the data of classmates' participation in various extra-curricular activities.
- (3) Use suitable graphs to represent data.
- (4) Give questionnaires to all classmates and collect their opinions.

43. The following table shows the training hours of 40 swimming team members during the last week.

Training hours	1 – 3	4 – 6	7 – 9	10 – 12	13 – 15
Number of members	4	6	10	14	6

Find the mean training hours of the members for the last week.

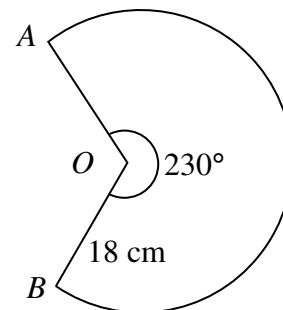
SECTION C: All working must be clearly shown.
Write the mathematical expressions, answers and statements/conclusions in the spaces provided in the ANSWER BOOKLET.

44. Mary deposited \$ P in a bank. The interest rate was 3% p.a. compounded yearly. The amount she received after 2 years was \$42 436. Find the value of P .
45. An organization interviewed 20 working women and recorded their working hours in the last week. The data (in hours) are shown as follows:

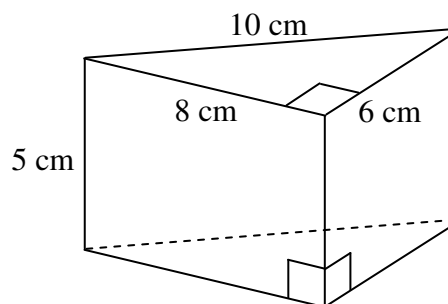
20	25	42	36	55
33	10	46	44	39
50	37	40	46	38
28	48	35	33	52

Use the data to complete the two frequency distribution tables in the **ANSWER BOOKLET**.

46. In the figure, the radius of sector OAB is 18 cm and reflex $\angle AOB = 230^\circ$. Find the area of the sector. Correct the answer to the nearest 0.1 cm^2 .



47. The figure shows a solid triangular prism. Its base is a right-angled triangle. Find the total surface area of the prism.

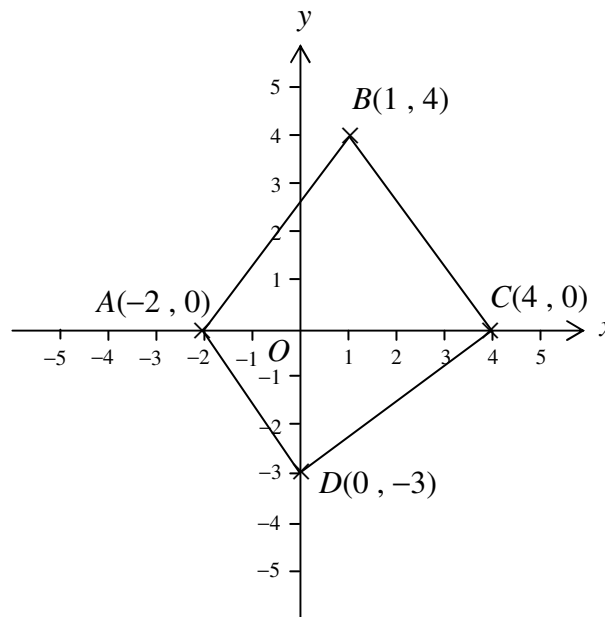


48. Complete the table for the equation $x - y = 1$ in the **ANSWER BOOKLET**.

x	-2	0	2
y			1

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

49. Find the area of quadrilateral $ABCD$ in the rectangular coordinate plane.

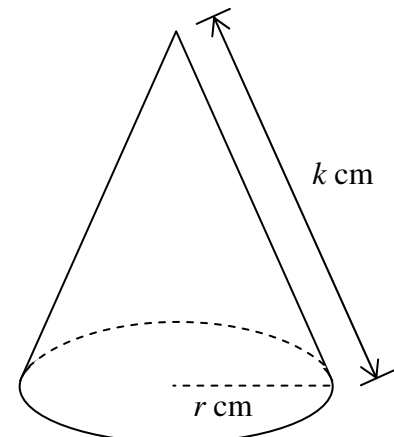


50. $A \text{ cm}^2$ is the total surface area of a cone. A can be calculated by the following formula

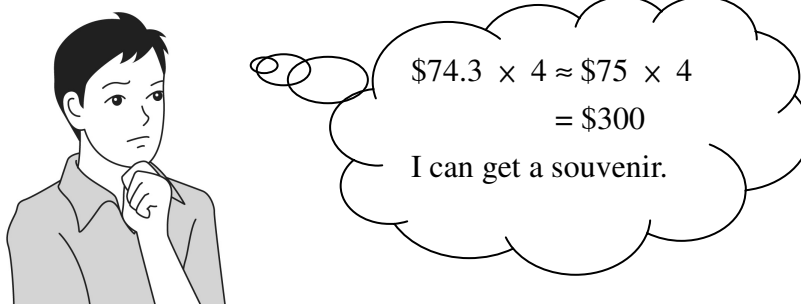
$$A = \pi r(k + r),$$

where $r \text{ cm}$ and $k \text{ cm}$ represent the base radius and the slant height of the cone respectively.

- Make k the subject of the formula.
- If $A = 90\pi$ and $r = 5$, find the value of k .



51. A mixture weighs 20 g. It is a mixture of sand and rice. The weight of sand in the mixture is 8 g.
- (a) Find the weight of sand : the weight of rice.
 - (b) Michael adds an extra amount of sand to the mixture so that the ratio of the weight of sand to rice is changed to 5 : 6. How many grams of sand should he add?
52. Customers can get a souvenir for any purchase of \$300 or above in a department store. Jack buys 4 identical gifts in the department store. The price of each gift is \$74.3. After estimation, Jack thinks that he can get a souvenir.



Without actual calculations, judge whether Jack's estimation is reasonable. Explain why you agree or disagree with Jack's method of estimation.

END OF PAPER

