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Education Bureau
Territory-wide System Assessment 2010
Secondary 3
Mathematics
QUESTION BOOKLET

INSTRUCTIONS

1. There are 51 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.

1. Kenny is a security guard and works 7 hours every day. For 31% of the time he inspects the car park and the rest of time he stays in the office. Which of the following expressions is most appropriate to estimate the number of hours that Kenny stays in the office every day?
 - A. $6 \times 30\%$ hours
 - B. $6 \times 70\%$ hours
 - C. $9 \times 30\%$ hours
 - D. $9 \times 70\%$ hours

2. Round off 0.059 99 to 3 significant figures.
 - A. 0.059 9
 - B. 0.06
 - C. 0.060
 - D. 0.060 0

3. Which of the following numbers is closest to 14?
 - A. $\sqrt{28}$
 - B. $\sqrt{140}$
 - C. $\sqrt{170}$
 - D. $\sqrt{200}$

4. Which of the following polynomials has / have unlike terms?
 - I. $5a + 5ab$
 - II. $4a^2 - 6a^2$
 - III. $6a^2 + 6a$
 - A. I only
 - B. II only
 - C. I and III only
 - D. I, II and III

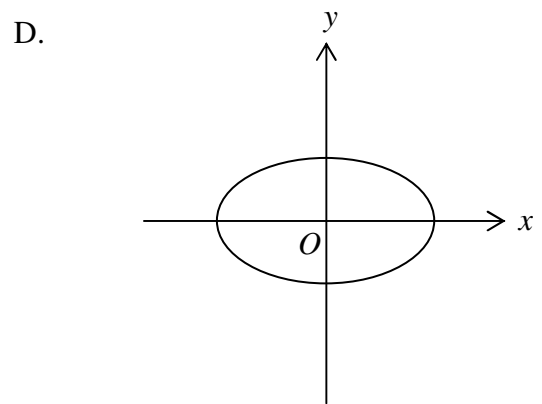
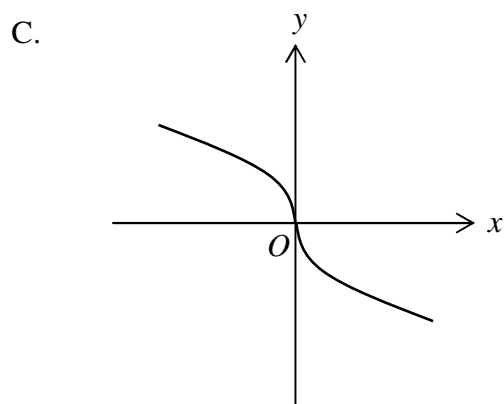
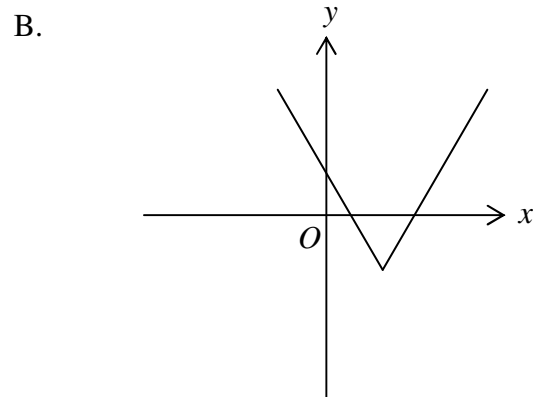
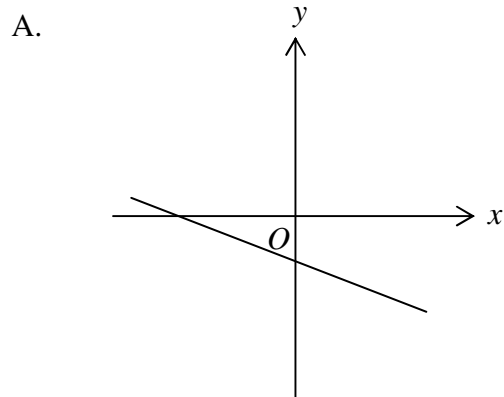
5. Simplify $5x^2 - 2x + 2x^2$.

- A. $2x^2 + 3x$
- B. $7x^2 - 2x$
- C. $5x^3$
- D. $5x^2$

6. $(2a^2b^2)(-2ab) =$

- A. $-4a^3b^3$.
- B. $-4ab$.
- C. $-ab$.
- D. $2a^2b^2 - 2ab$.

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



8. Which of the following is an identity?

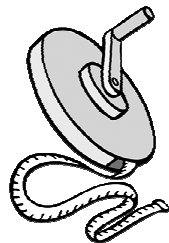
- A. $4(x-1) = 4x-1$
- B. $(x+3)^2 = x^2 + 9$
- C. $4x + 2(x-1) = 2(3x-1)$
- D. $7-3x = -(3x+7)$

9. The height of the Red Heart Building is 927 m (correct to the nearest m). Which of the following **CANNOT** be its actual height?

- A. 926.5 m
- B. 927.0 m
- C. 927.4 m
- D. 927.5 m

10. Which of the following tools measures the diameter of the cross-section of a piece of chalk with the smallest error?

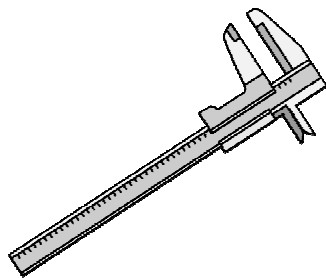
A. Tape measure



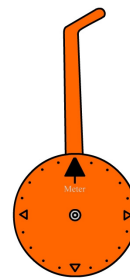
B. Measuring tape



C. Vernier



D. Trundle wheel

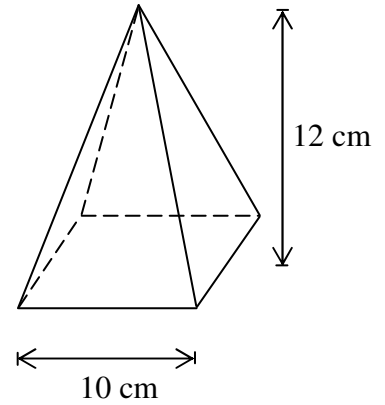


11. Which of the following descriptions of polygons **MUST** be correct?

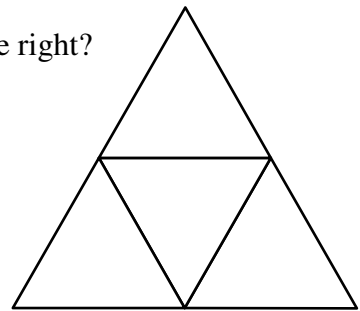
- A. Any rhombus must be a regular polygon.
- B. Any isosceles triangle must be a regular polygon.
- C. All interior angles of any regular polygon must be acute.
- D. All sides of any regular polygon must be equal in length.

12. In the figure, the pyramid has a square base with a side length of 10 cm. Its height is 12 cm. The volume of the pyramid is

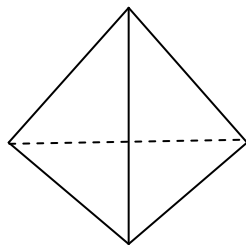
- A. 400 cm^3 .
- B. 480 cm^3 .
- C. 1200 cm^3 .
- D. 3600 cm^3 .



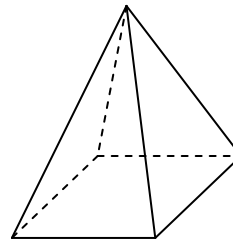
13. Which of the following 3-D figures can be made by the net on the right?



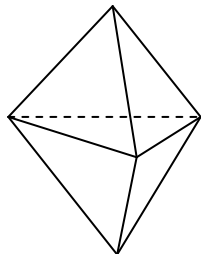
A.



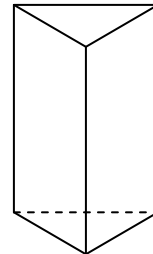
B.



C.

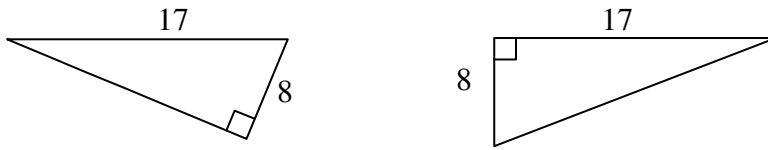


D.

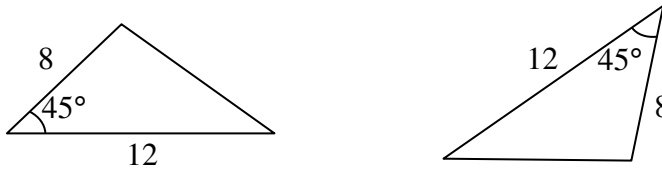


14. Which of the following pairs of triangles **MUST** be congruent?

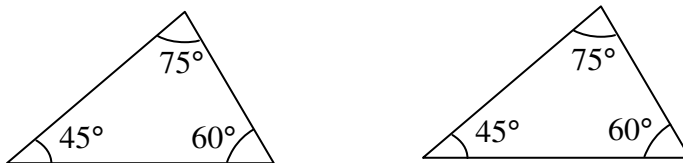
A.



B.



C.

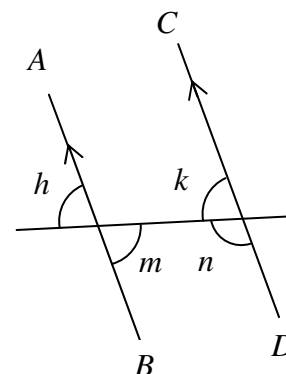


D.

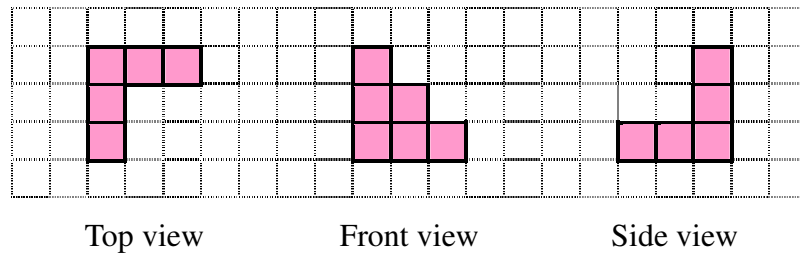


15. In the figure, $AB \parallel CD$. Which of the following is a pair of interior angles on the same side?

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

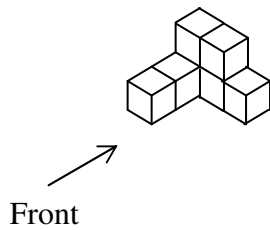


16. The figures below show 2-D representations of a solid from various views:

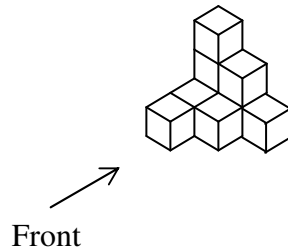


Which of the following could be the solid?

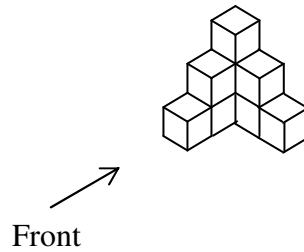
A.



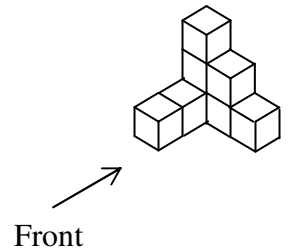
B.



C.



D.

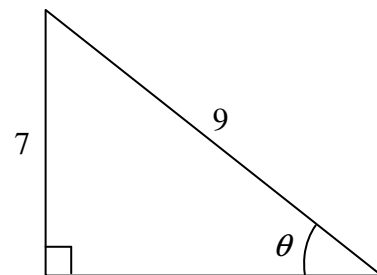


17. $A(2, -3)$ and $B(6, 7)$ are two points on straight line L in the rectangular coordinate plane. Find the slope of L .

- A. 2
- B. $\frac{1}{2}$
- C. $\frac{5}{2}$
- D. $\frac{2}{5}$

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

- A. 52°
- B. 51°
- C. 39°
- D. 38°



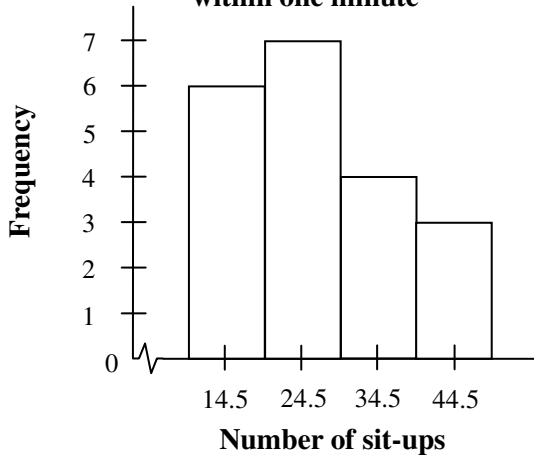
19. The stem-and-leaf diagram below shows the number of sit-ups performed by 20 students within one minute in a physical fitness test.

Number of sit-ups performed by 20 students within one minute in a physical fitness test

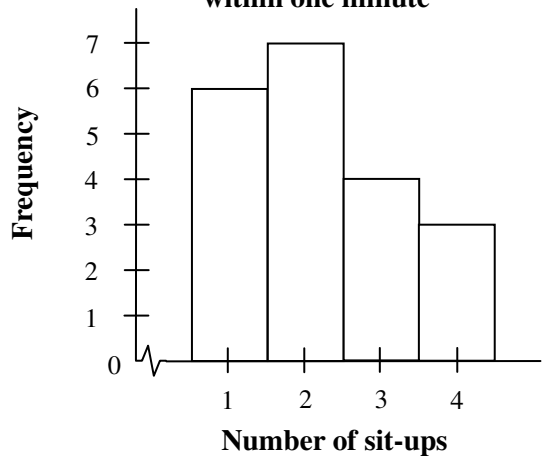
<u>Stem (10)</u>	<u>Leaves (1)</u>
1	3 6 6
2	2 4 5 5 6 7
3	0 3 4 4 4
4	0 1 1 2 3 3

If the above data is presented by a histogram, which of the following should be obtained?

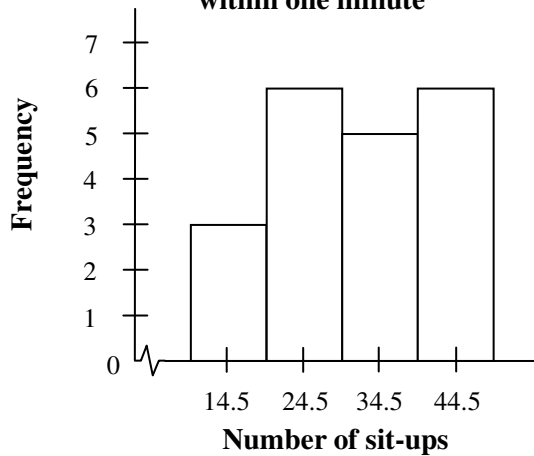
A. Number of sit-ups performed by 20 students within one minute



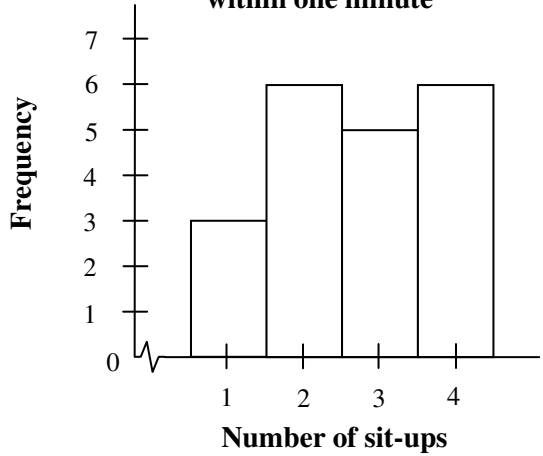
B. Number of sit-ups performed by 20 students within one minute



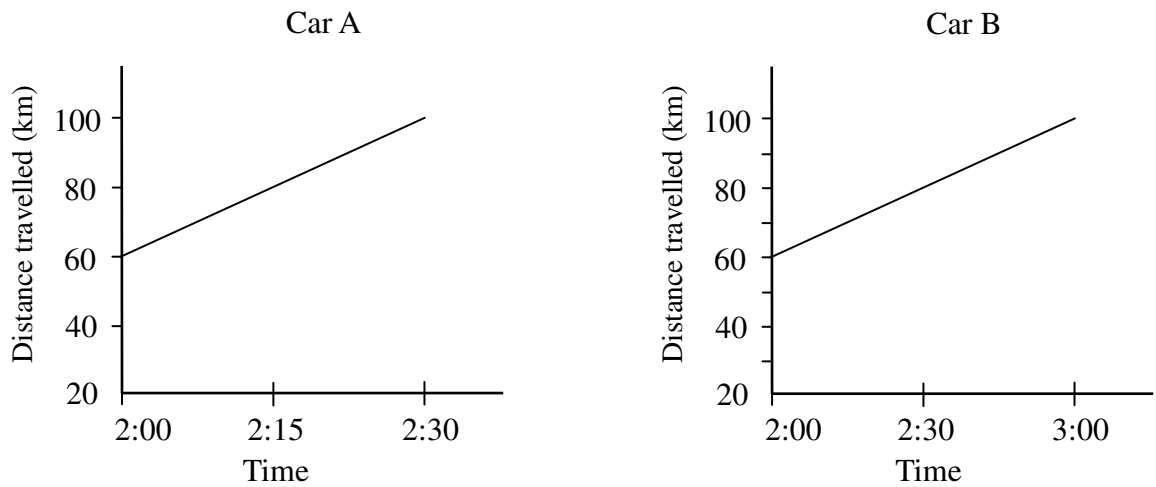
C. Number of sit-ups performed by 20 students within one minute



D. Number of sit-ups performed by 20 students within one minute



20. The following graphs show the distance travelled by car A and car B respectively. Accordingly, Peter concludes that the speeds of car A and car B are the same.



Which of the following statements is the most likely reason that Peter is misled by the above graphs?

- A. There is no comparison of the graphs of other cars.
- B. The scales of the 2 horizontal axes are not the same.
- C. The scales of the 2 vertical axes are not the same.
- D. The scales on the 2 vertical axes do not start from 0.

SECTION B: Write ALL the answers in the ANSWER BOOKLET.

Working need not be shown.

21. Hong Kong Observatory uses positive and negative numbers to represent temperature in degree Celsius ($^{\circ}\text{C}$). Use suitable numbers to represent the following temperatures:

- (i) 7 degrees below zero
- (ii) 32 degrees

22. Calculate $(-2)[(-6)+(-3)(4)]$.

23. In the following situations, are the values mentioned exact or estimated?

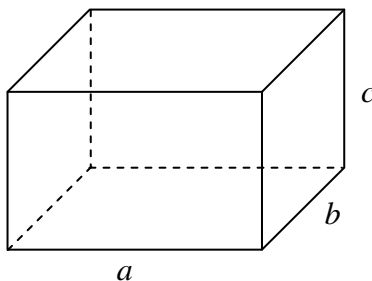
- (i) The capacity of High Island Reservoir is $273\,000\,000\text{ m}^3$.
- (ii) The capacity of High Island Reservoir is 20 % more than that of Plover Cove Reservoir.

24. In the figure, the total surface area A of the cuboid can be calculated by the following formula:

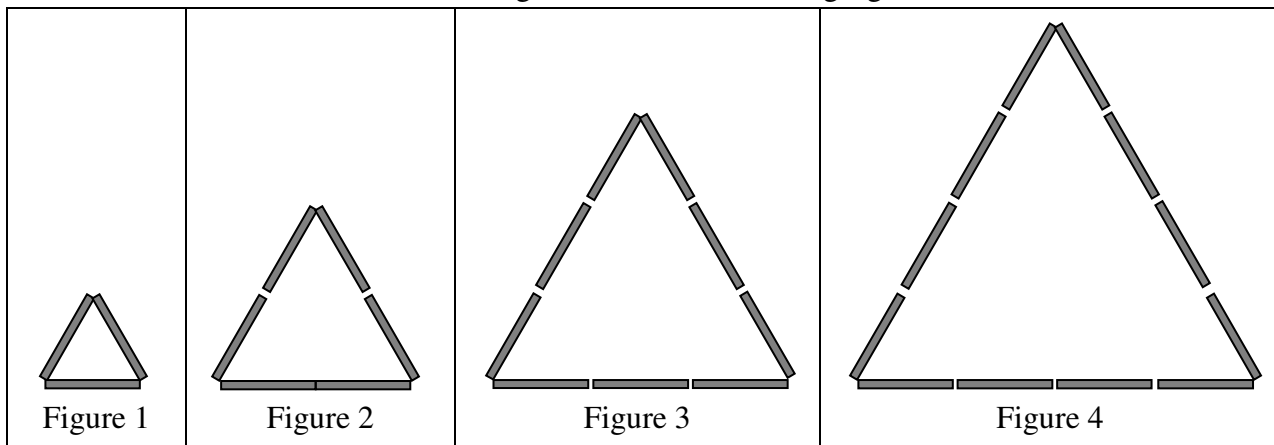
$$A = 2(ab + bc + ac)$$

where a , b and c represent the length, width and height of the cuboid respectively.

If $a = 6$, $b = 4$ and $c = 5$, find the value of A .



25. Michael used some sticks of the same length to form the following figures:



According to the above pattern, how many sticks should Michael use in the 5th figure?

26. Factorize $4x^2 - 4x + 1$.

27. Factorize $x^2 - 7x + 10$.

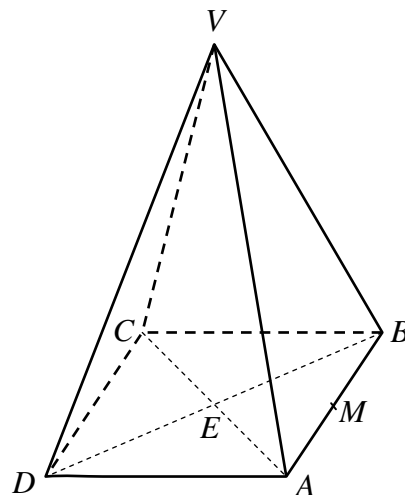
28. Solve $\frac{4-x}{3} = -1$.

29. Simplify $\frac{3xy}{x^2} - \frac{3y}{2x}$.

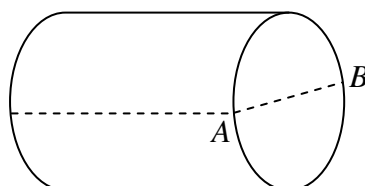
30. Make x the subject of the formula $y = \frac{x}{1+x}$.

31. Solve the inequality $3x+1 \geq 10$.

32. $VABCD$ is a right pyramid with a square base $ABCD$. $ABCD$ is a horizontal plane. E is the point of intersection of AC and BD . M is the midpoint of AB . Name the angle between the plane VAB and the plane $ABCD$.



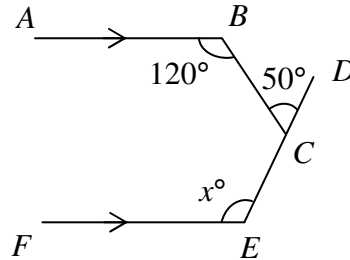
33. A right cylinder is placed horizontally as shown. Sketch the cross-section of the cylinder in the **ANSWER BOOKLET** if it is cut horizontally along the diameter AB .



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



35. In the figure, DCE is a straight line, $AB \parallel FE$, $\angle ABC = 120^\circ$ and $\angle BCD = 50^\circ$.
Find the value of x .



36. Figure 1 shows a cube $ABCDEFGH$. In Figure 2, plane $DHGA$ is a plane of reflectional symmetry of the cube. Apart from the plane $DHGA$, name **ANY TWO** of the **REMAINING** planes of reflectional symmetry of the cube in Figure 1.

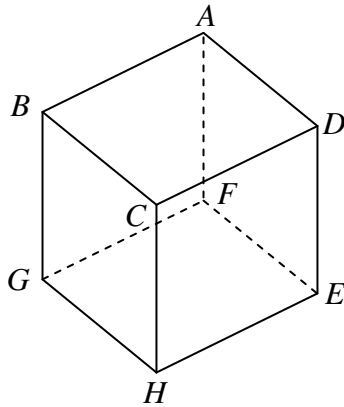


Figure 1

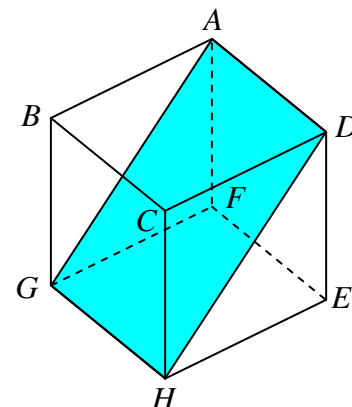
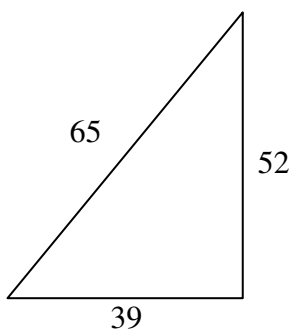


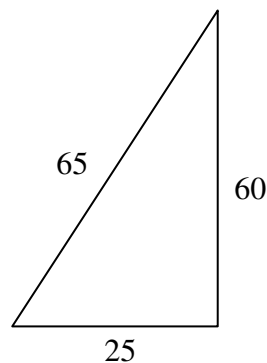
Figure 2

37. Which of the following must be right-angled triangle(s)? (May be more than one answer)

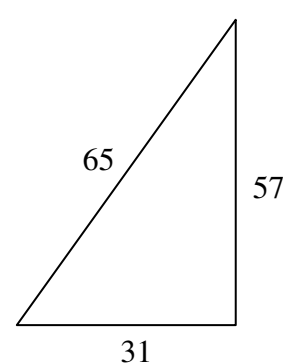
Triangle A



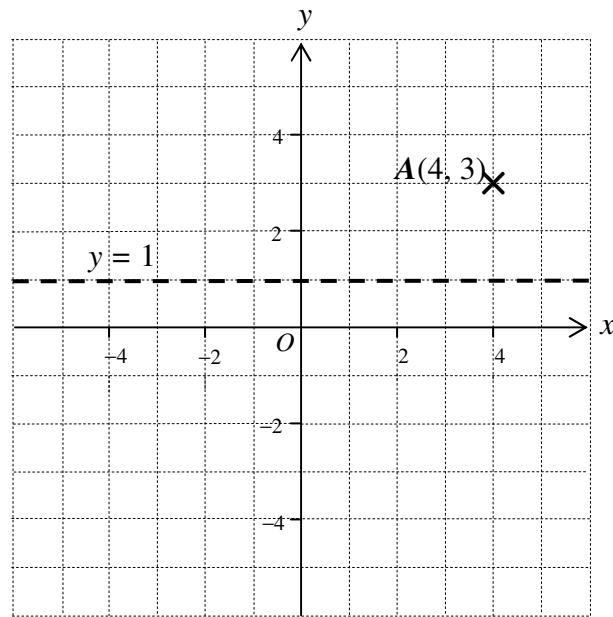
Triangle B



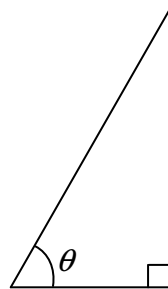
Triangle C



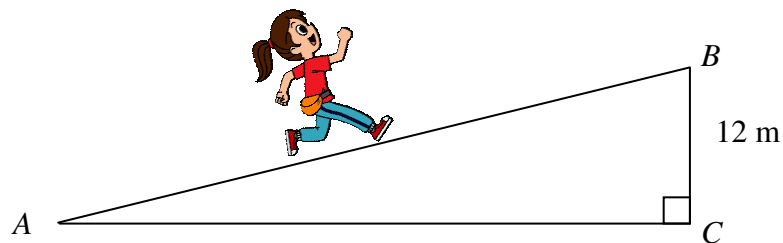
38. Point $A(4, 3)$ is reflected along the straight line $y = 1$ to the point A' . Find the coordinates of A' .



39. In the figure, $\tan \theta = 1.5$.
Find θ . (Correct to the nearest 0.1°)



40. Vivian walks along a path AB of slope $\frac{1}{4}$. If the vertical distance BC is 12 m, find the horizontal distance AC .



41. Determine whether each of the following data is discrete or continuous.
- (i) The number of reservoirs in Hong Kong
 - (ii) The height of water level of Pok Fu Lam Reservoir

42. The monthly profits (in HK dollars) of Excellent Company from January to May 2010 are as follows:

53 000 , 66 000 , 73 000 , 54 000 , 64 000

Find the arithmetic mean of the monthly profits in the above period.

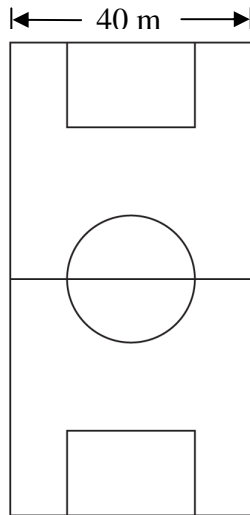
43. Excellent College holds a talent show. The Principal gives marks based on content, creativity and presentation of the participants. For each item, 1 – 10 marks can be given. Ben is one of the participants. The table below shows the marks Ben got and the weighting of each item.

	Content	Creativity	Presentation
Marks	8	5	7
Weighting	30%	30%	40%

Find the weighted mean mark of Ben.

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

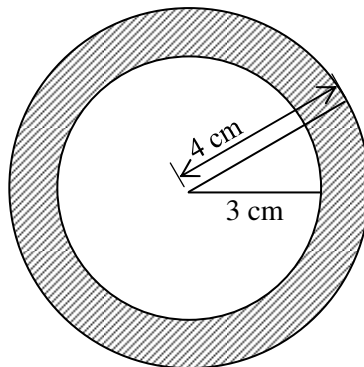
44. The ratio of the length of a football field to its width is 5 : 2. If the width is 40 m, find the area of the football field.



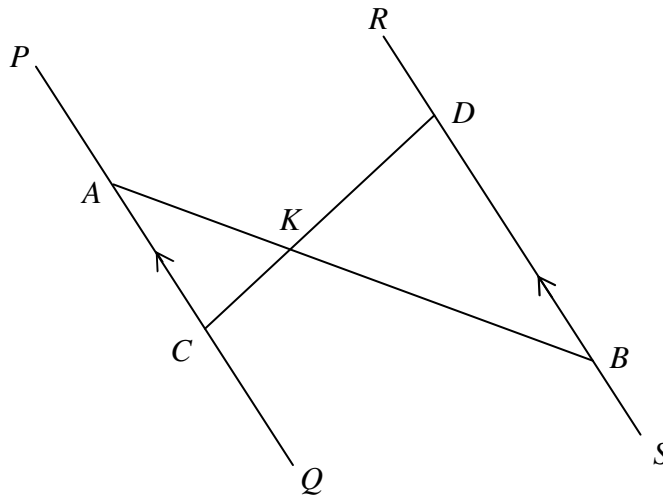
45. Simplify $\frac{x^{-2}}{(y^2)^3}$ and express the answer with positive indices.

46. Solve the simultaneous equations $\begin{cases} 3x + y = 70 \\ y = 2x - 30 \end{cases}$.

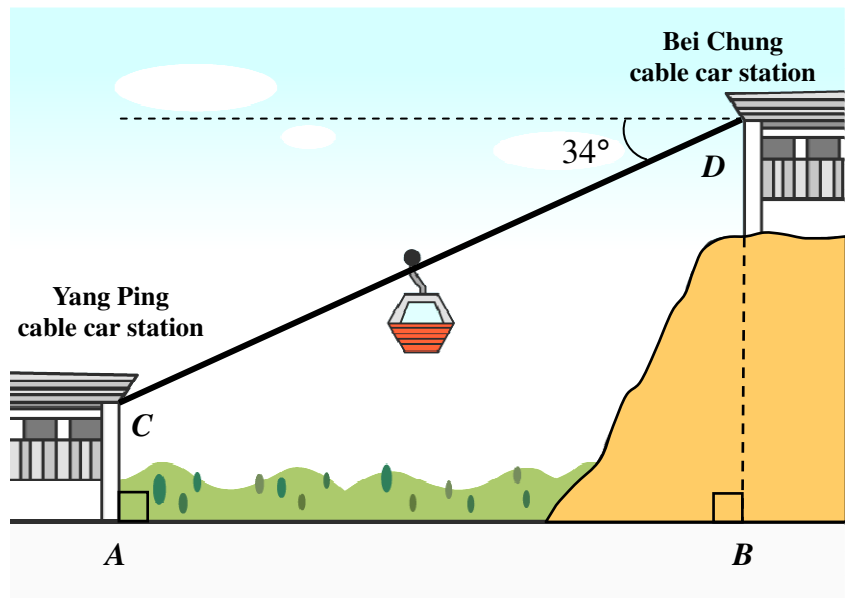
47. The figure shows a ring which is formed by two circles with the same centre. The radii of the small circle and the large circle are 3 cm and 4 cm respectively.
- (a) Find the areas of the small circle and the large circle. Express your answers in terms of π .
- (b) Find the shaded area. Express your answer in terms of π .



48. In the figure, $PQ \parallel RS$, line segments AB and CD intersect at K . Prove that $\triangle ACK \sim \triangle BDK$.



49. In the figure, Bei Chung cable car station and Yang Ping cable car station are connected by cable CD which is 800 m long. The angle of depression of C from D is 34° . Find the horizontal distance AB between these two stations, correct the answer to 1 decimal place.
(Assume that CD is a straight line)



50. The table below shows the distribution of the ages of 40 staff in Tai Tai Fast Food Shop.

Age	Class Mark	Frequency
21 – 30	25.5	6
31 – 40	35.5	8
41 – 50	45.5	14
51 – 60	55.5	12

According to the data, complete the histogram in the **ANSWER BOOKLET**.

51. Terence is responsible for buying gifts for a Christmas party. He has \$70 and spends as much as possible. There are 3 kinds of gifts available, and their prices are \$9.8, \$18.9 and \$29.4 respectively. Terence must buy at least 2 kinds of gifts with different prices. Using estimation, find the number of gifts that can be bought by Terence, and briefly explain your method.

END OF PAPER

