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Education Bureau
Territory-wide System Assessment 2013
Secondary 3
Mathematics
QUESTION BOOKLET

INSTRUCTIONS

1. There are 50 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. In each of the following situations, determine whether the value mentioned is obtained by estimation or by computation of the exact value.

- (i) It was reported on news that there were 400 000 people watching the fireworks display on both sides of Victoria Harbour.
- (ii) 132 photographs were displayed in an exhibition.

	(i)	(ii)
A.	Computation of the exact value	Computation of the exact value
B.	Computation of the exact value	Estimation
C.	Estimation	Computation of the exact value
D.	Estimation	Estimation

2. Round off 0.048 076 to 3 decimal places.

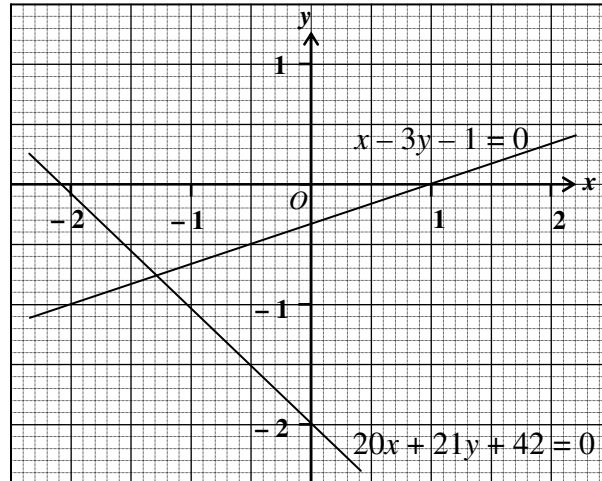
- A. 0.05
- B. 0.048
- C. 0.048 1
- D. 0.048 08

3. Alan bought 8 bottles of orange juice in a supermarket. He paid \$100 and the change was \$ x . Find the price of a bottle of orange juice.

- A. $\$ \left(\frac{100}{8} - x \right)$
- B. $\$ \left(\frac{100 - x}{8} \right)$
- C. $\$ \left(\frac{100}{8} + x \right)$
- D. $\$ \left(\frac{100 + x}{8} \right)$

4. The constant term of the polynomial $6x^3 + 5x^2 + x + 9$ is
- A. 3.
 - B. 4.
 - C. 6.
 - D. 9.
5. $(-4)^3 =$
- A. -64 .
 - B. -12 .
 - C. 12 .
 - D. 64 .
6. Ella bought y model cars. Joseph bought 3 times as many model cars as Ella did. However, Joseph carelessly lost 2 cars. Now, he still has 16 cars left. Which of the following equations can be used to find the value of y ?
- A. $3y - 2 = 16$
 - B. $3y + 2 = 16$
 - C. $\frac{y}{3} - 2 = 16$
 - D. $\frac{y}{3} + 2 = 16$
7. Which of the following points lies on the straight line $y + 2 = 0$?
- A. $(-2, 0)$
 - B. $(0, -2)$
 - C. $(2, 0)$
 - D. $(0, 2)$

8.

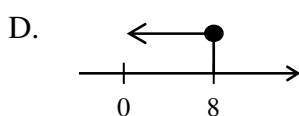
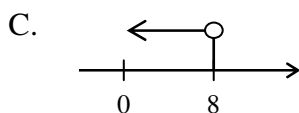
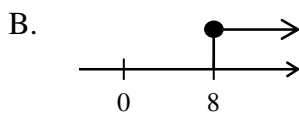
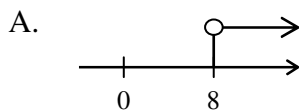


The above figure shows the graphs of $x - 3y - 1 = 0$ and $20x + 21y + 42 = 0$.

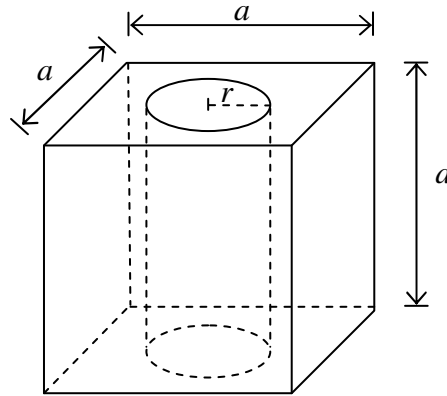
Solve the simultaneous equations $\begin{cases} x - 3y - 1 = 0 \\ 20x + 21y + 42 = 0 \end{cases}$ graphically.

- A. The approximate solution is $(-1.3, -0.8)$.
- B. The exact solution is $(-1.3, -0.8)$.
- C. The exact solution is $(-1.5, -1)$.
- D. The approximate solution is $(-1.5, -1)$.

9. Which of the following diagrams represents $x \geq 8$?



10.

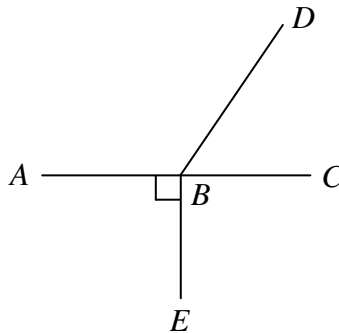


The figure shows a solid which is formed by a cube of side a with a cylindrical portion being cut out. The radius and height of the removed cylindrical portion are r and a respectively. By considering the **dimensions**, determine which of the following could express the total surface area of the solid.

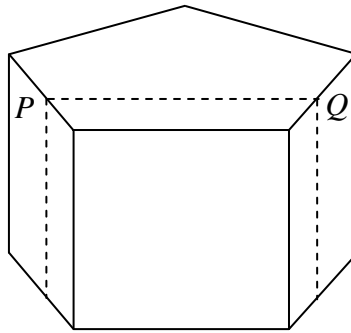
- A. $12a + 4\pi r$
- B. $a(a^2 - \pi r^2)$
- C. $6a^2 + 2\pi r(a - r)$
- D. $(a - r)(12a - \pi r^2)$

11. In the figure, ABC is a straight line. Which of the following is a straight angle?

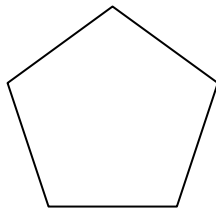
- A. $\angle ABC$
- B. $\angle CBD$
- C. $\angle DBE$
- D. $\angle EBA$



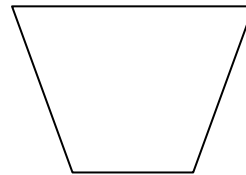
12. The figure shows a right prism. Keith sketches a cross-section which is cut along the dotted line PQ and is perpendicular to the base. Which of the following sketches is the plane diagram of the cross-section?



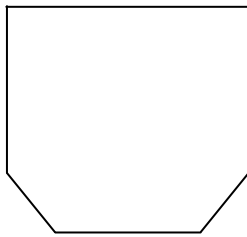
A.



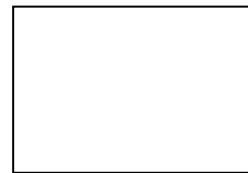
B.



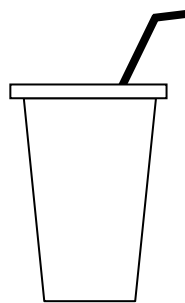
C.



D.



- 13.

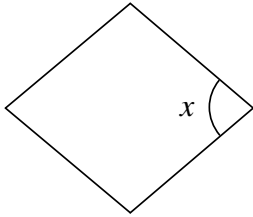


Will the size and shape of the above figure be changed after translation?

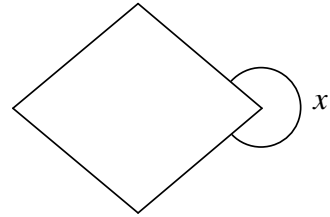
	Size	Shape
A.	unchanged	unchanged
B.	unchanged	changed
C.	changed	unchanged
D.	changed	changed

14. Which of the following figures shows that x is an exterior angle of the quadrilateral?

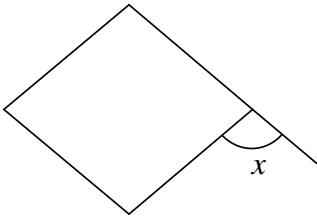
A.



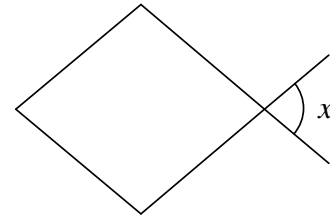
B.



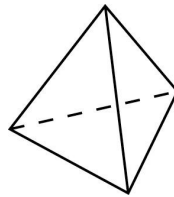
C.



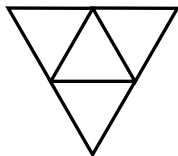
D.



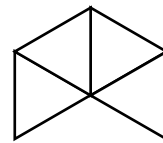
15. Which of the following nets **CANNOT** be folded into a regular tetrahedron?



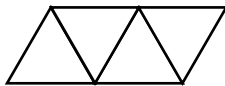
A.



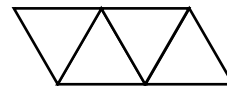
B.



C.

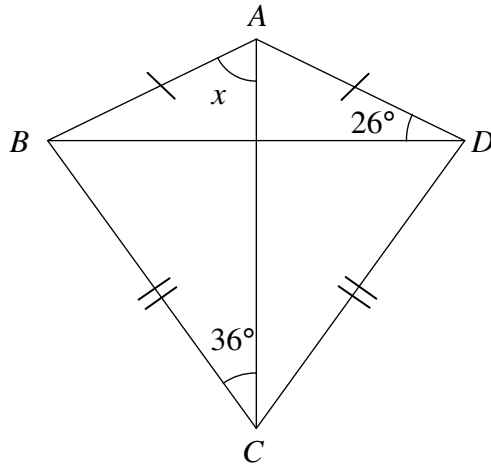


D.



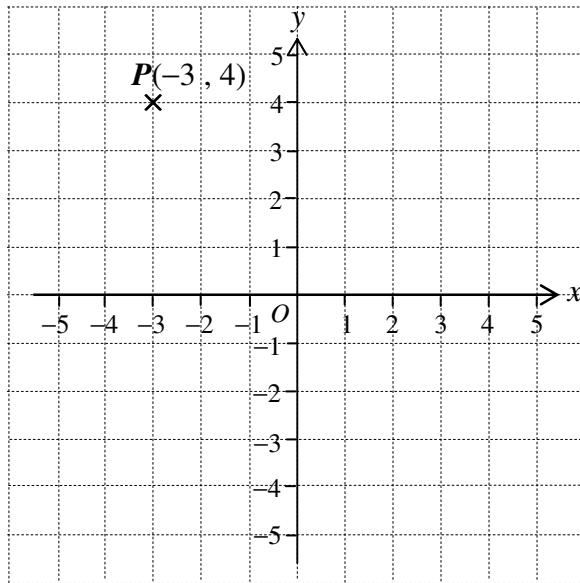
16. In the figure, $ABCD$ is a kite where $AB = AD$ and $BC = DC$.
Find the value of x .

- A. 26°
- B. 36°
- C. 54°
- D. 64°



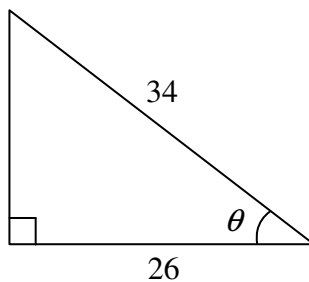
17. In the figure, $P(-3, 4)$ is rotated about the origin O through 270° in a clockwise direction to P' .
The coordinates of P' are

- A. $(4, 3)$.
- B. $(3, 4)$.
- C. $(-4, -3)$.
- D. $(-3, -4)$.



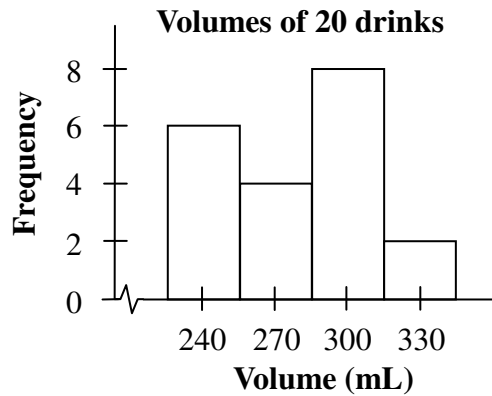
18. Refer to the figure, find θ . (Correct to the nearest degree)

- A. 53°
- B. 50°
- C. 40°
- D. 37°

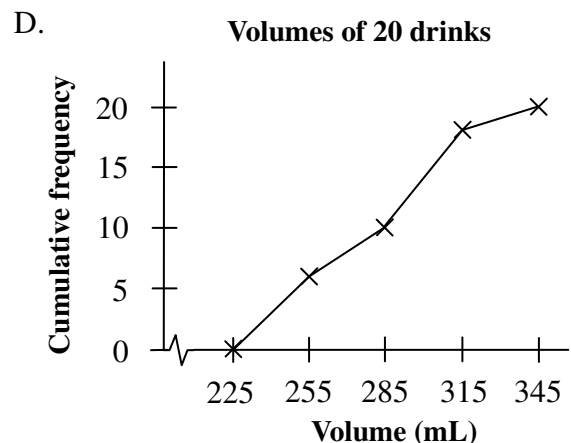
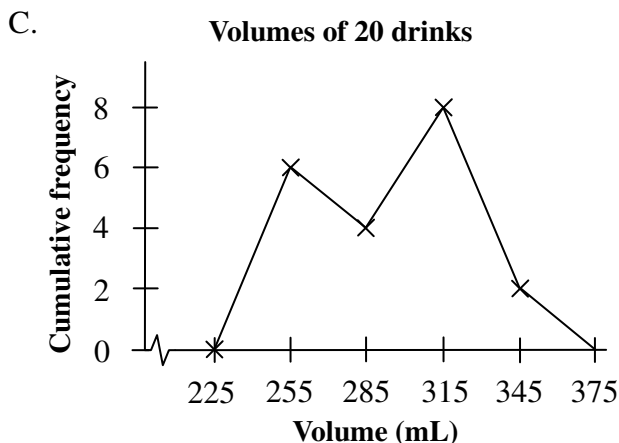
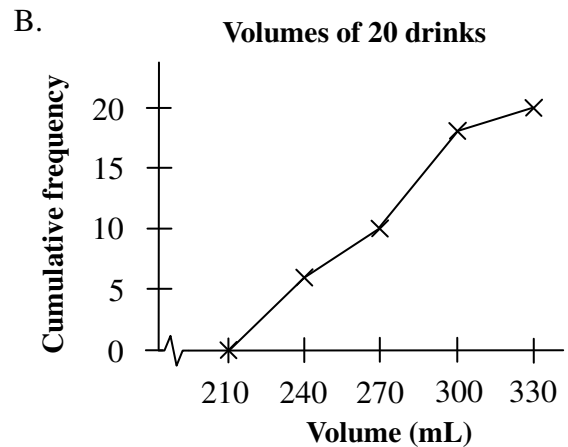
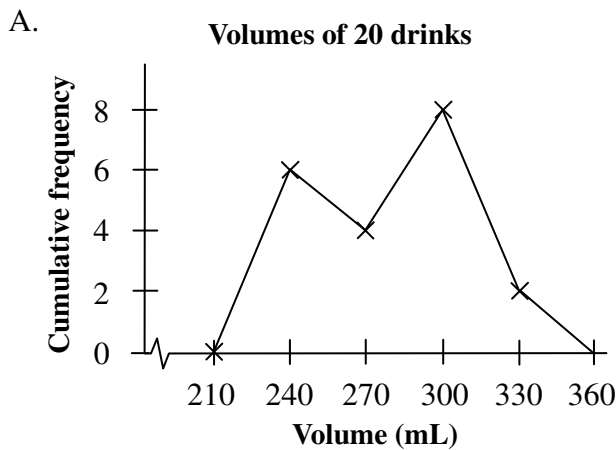


19. Which of the following surveys is **NOT** suitable by using 'questionnaire' to collect the required data?
- A. The survey about the further studies of S6 graduates of Perfect Secondary School
 - B. The survey about the number of credit cards owned by the students of Mathematics Department of Perfect University
 - C. The survey about the favourite fast food of P3 students of Perfect Primary School
 - D. The survey about the amount of sugar found in each type of bread sold at Perfect Bakery

20. The diagram below shows the volumes (mL) of 20 drinks.

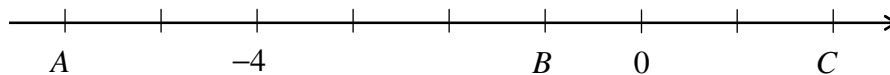


If the above data is presented by a cumulative frequency polygon, which of the following should be obtained?



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.

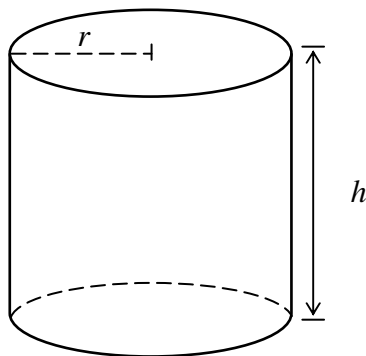


22. The length of a bacterium is about 0.000 003 m. Use scientific notation to represent this number.
23. During the 2012 Olympics in London, the numbers of medals won by Germany and the United States were in the ratio 11 : 26. If the United States won 104 medals, find the number of medals won by Germany.
24. In the figure, the total surface area A of the solid cylinder can be calculated by the following formula:

$$A = 2\pi rh + 2\pi r^2$$

where r and h represent the base radius and the height of the solid cylinder respectively.

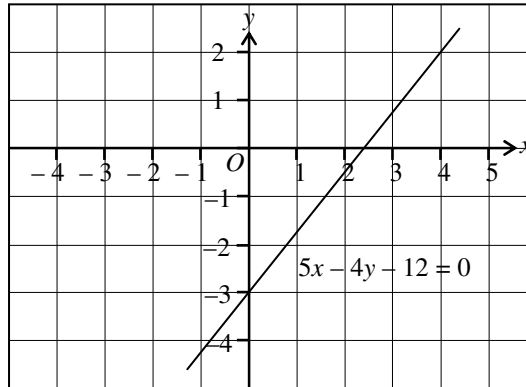
If $r = 3$ and $A = 48\pi$, find the value of h .



25. The n^{th} term of a sequence is $\frac{n+6}{n+3}$. Find the value of the 7th term of the sequence.
26. Expand $-2x(x^2 - 3)$.
27. Factorize $ah + ak + 3h + 3k$.

28. Factorize $3x^2 + 4x + 1$.

29.



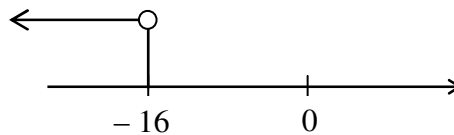
The above figure shows the graph of $5x - 4y - 12 = 0$. Which of the following points lie(s) on the graph? (May be more than one answer)

$P(-3, 0)$, $Q(0, -3)$, $R(3, 1)$, $S(4, 2)$

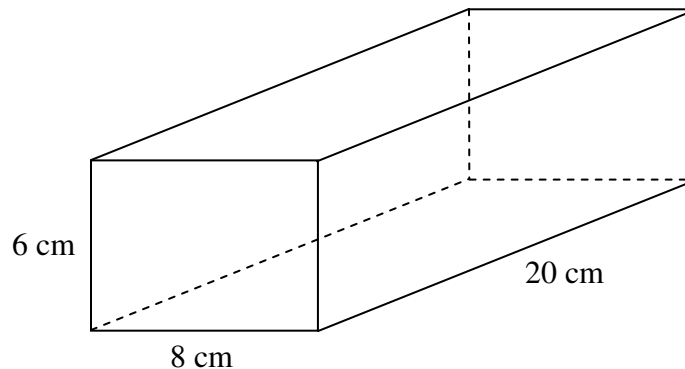
30. Consider the formula $S = \frac{a(r^3 - 1)}{r - 1}$.

If $a = 8$ and $r = 3$, find the value of S .

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

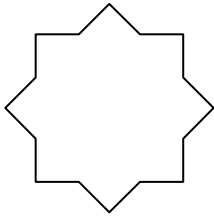


32. The length, width and height of a solid cuboid are 20 cm, 8 cm and 6 cm respectively. Find the total surface area of the cuboid.

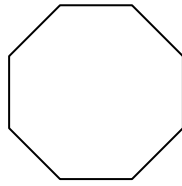


33. Which of the following polygons is / are convex? (May be more than one answer)

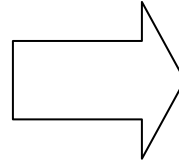
P.



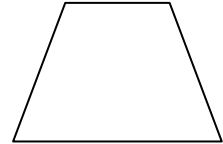
Q.



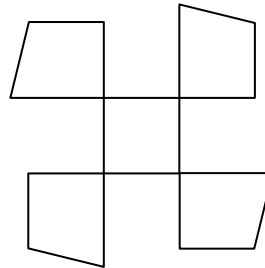
R.



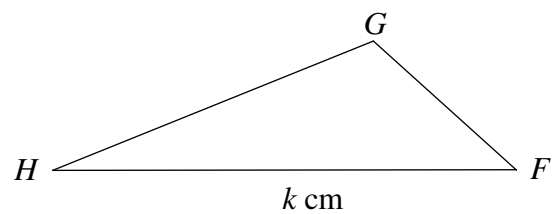
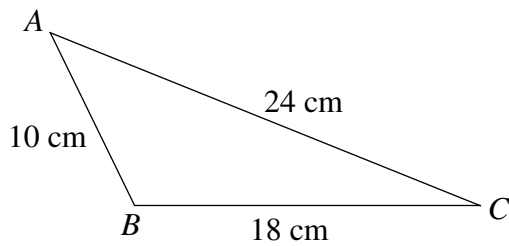
S.



34. The figure below has rotational symmetry. Find its order of rotational symmetry.

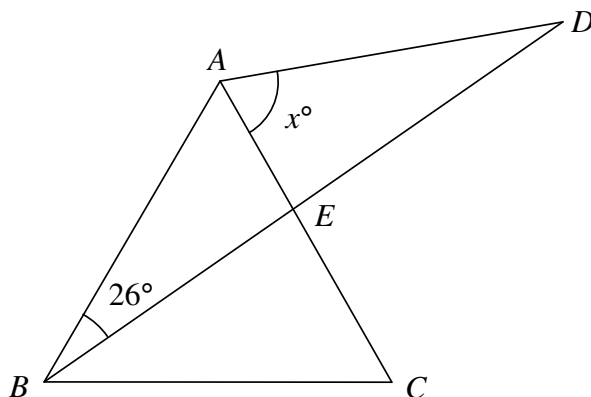


35.

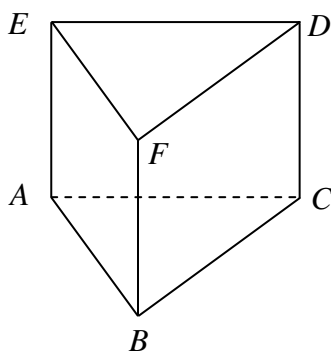


In the figure, $\triangle ABC \cong \triangle FGH$. Find the value of k .

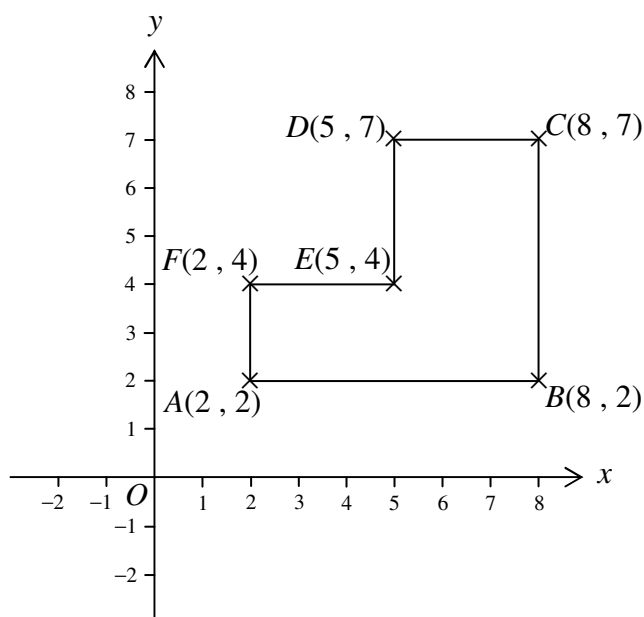
36. In the figure, $\triangle ABC$ is an equilateral triangle. BED is a straight line, $\angle ABD = 26^\circ$ and $AB = AD$. Find the value of x .



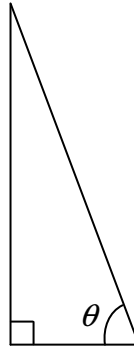
37. The figure shows a right prism $ABCDEF$. Its base ABC is a triangle. Name the angle between the vertical plane $ABFE$ and the vertical plane $BCDF$.



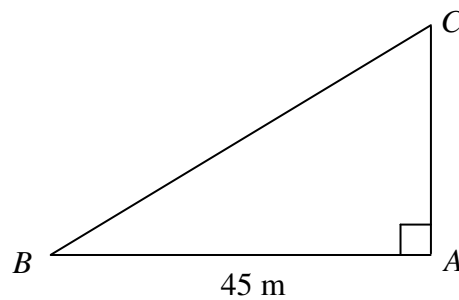
38. Find the area of the figure $ABCDEF$ in the rectangular coordinate plane.



39. In the figure, $\tan \theta = \frac{8}{3}$. Find θ . (Correct to the nearest 0.1°)



40. In the figure, the slope of inclined road BC is $\frac{3}{5}$. If the horizontal distance AB is 45 m, find the vertical distance AC .



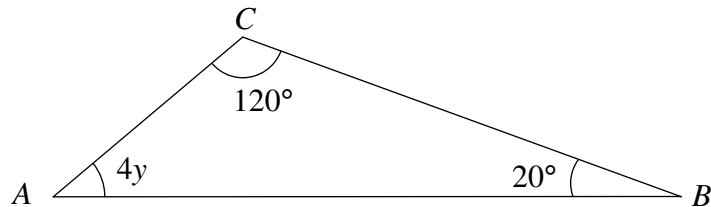
41. The following table shows the distribution of the lifespan of 50 AA batteries in a test.

Lifespan (h)	25–27	28–30	31–33	34–36
Frequency	8	14	22	6

Find the modal class of the lifespan of the 50 batteries.

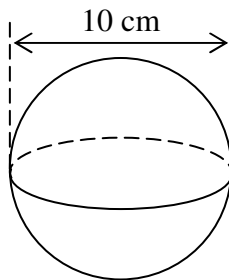
SECTION C: All working must be clearly shown.
 Write the mathematical expressions, answers and statements/conclusions
 in the spaces provided in the ANSWER BOOKLET.

42. In $\triangle ABC$, $\angle ABC = 20^\circ$ and $\angle ACB = 120^\circ$. Find y .

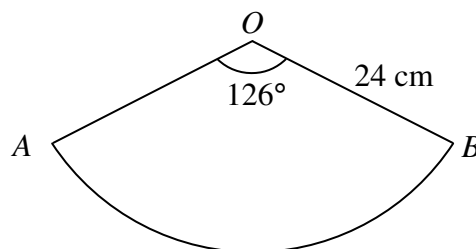


43. A wardrobe is sold for \$2 700 at a loss of 25%. Find the cost price of the wardrobe.

44. The figure shows a sphere of diameter 10 cm. Find the volume of the sphere.
 Correct the answer to the nearest cm^3 .



45. In the figure, the radius of sector OAB is 24 cm and $\angle AOB = 126^\circ$. Find the length of \widehat{AB} .
 Correct the answer to the nearest 0.1 cm.



46. The stem-and-leaf diagram below shows the marks obtained by 3B students in a Mathematics test.

Marks obtained by 3B students in a Mathematics test

Stem (Tens digits)	Leaf (Units digits)
3	5 6 6 7 8 9
4	1 2 3 6 8 8
5	2 3 4 4 7 7 8 8
6	0 2 7 9
7	3 6 9
8	2 3 7

According to the above diagram, answer the following questions.

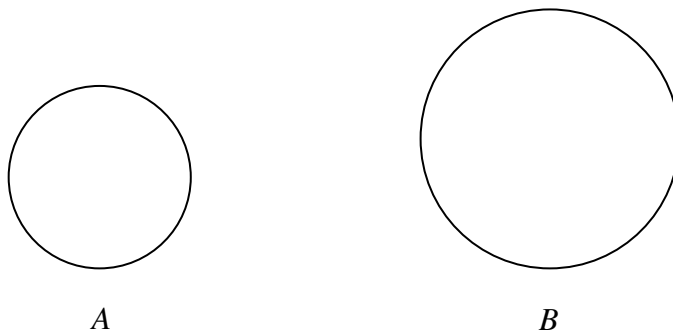
- How many students are there in 3B?
- Find the median of the test marks.
- If the passing mark of this test is 50, find the percentage of students in 3B who pass the test.

47. Complete the table for the equation $y = 2x - 1$ 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**.

48. In the figure, A and B are two circles. The circumference of A is 8π cm. The circumference of B is 6π cm longer than that of A . Find the radius of B .



49. Solve the simultaneous equations $\begin{cases} 3x - y = 20 \\ 2x + y = 15 \end{cases}$.

50. Jacky went to a supermarket to buy 2 cans of baked beans with tomato sauce, 1 can of luncheon meat and 3 cans of corn soup. The prices of the items are listed below:

Items	Baked beans with tomato sauce	Luncheon meat	Corn soup
Unit price	\$19.8	\$14.7	\$9.6

Jacky found that he had \$100 only.

Based on the description above, give **an approximation for the unit price of each item** respectively. Use these 3 approximations to estimate the total amount required. Briefly explain whether Jacky had enough money to pay for the items.

END OF PAPER

