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Education Bureau
Territory-wide System Assessment 2017
Secondary 3 Mathematics
QUESTION BOOKLET

INSTRUCTIONS

1. There are 47 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. Which of the following is correct?

- A. $\sqrt{99} > 9$
- B. $\sqrt{63} > 8$
- C. $\sqrt{14} > 7$
- D. $\sqrt{7} > 6$

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

- (i) The price of 100 g of beef is \$14.2.
- (ii) The weights of Simon and Peter are 60 kg and 70 kg respectively.

	(i)	(ii)
A.	Rate	Ratio
B.	Ratio	Rate
C.	Ratio	Ratio
D.	Rate	Rate

3. Patrick spends x hours doing exercise every week. Johnny spends 2 hours more than Patrick doing exercise every week. The total time they spend doing exercise every week is 16 hours. Which of the following equations can be used to find the value of x ?

- A. $x + 2 = 16$
- B. $x + 2x = 16$
- C. $x + x + 2 = 16$
- D. $x + x - 2 = 16$

4. Find the degree of the polynomial $5x^3 - 17x^2 + 9x + 6$.

A. 3

B. 4

C. 5

D. 6

5. Simplify $\frac{x^{-3}}{x^{-5}}$.

A. x^{-8}

B. x^8

C. x^2

D. x^{-2}

6. Which of the following is an equation with the root $\frac{1}{2}$?

A. $2x + 1 = 0$

B. $2x - 1 = 0$

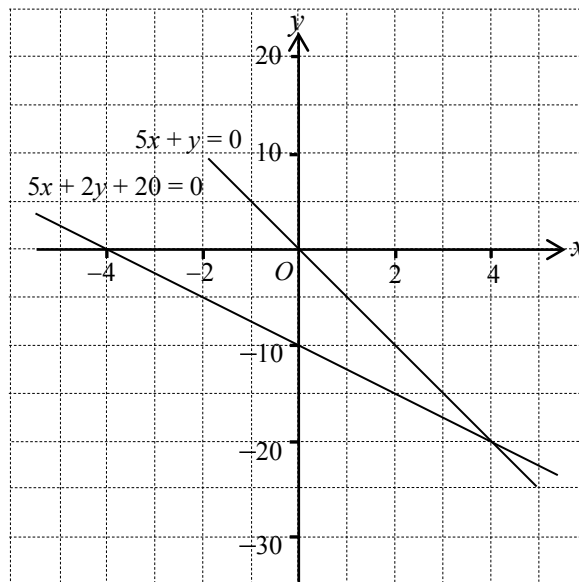
C. $x - 2 = 0$

D. $x + 2 = 0$

7. Which of the following points lies on the straight line $2x + 5y - 10 = 0$?

- A. $(0, -2)$
- B. $(-5, 0)$
- C. $(-5, 10)$
- D. $(10, -2)$

8.



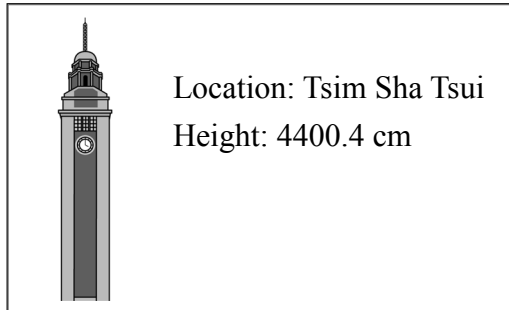
The above figure shows the graphs of $5x + 2y + 20 = 0$ and $5x + y = 0$.

According to the given graphs, solve the simultaneous equations $\begin{cases} 5x + 2y + 20 = 0 \\ 5x + y = 0 \end{cases}$.

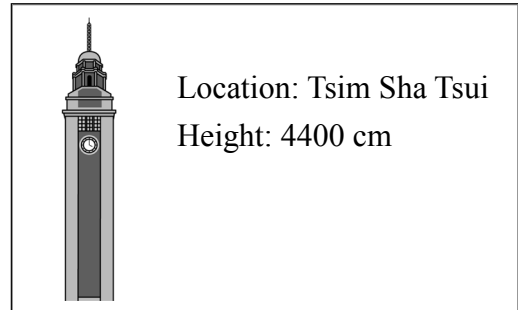
- A. $(-20, 4)$
- B. $(4, -20)$
- C. $(-4, 0)$
- D. $(0, -10)$

9. Which of the following leaflets shows the height of a clock tower with the most suitable unit and degree of accuracy?

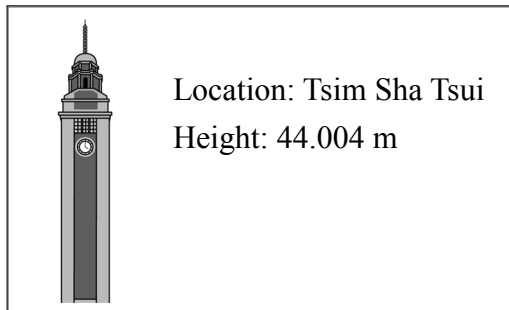
A.



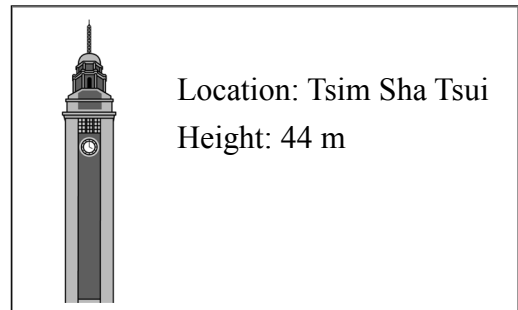
B.



C.

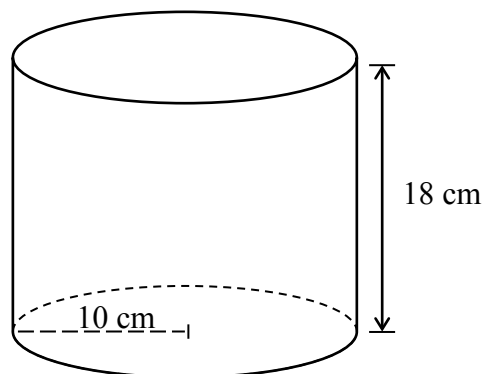


D.

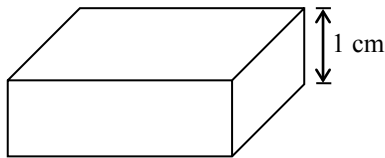


10. The figure shows a right cylinder. Its height is 18 cm and its base radius is 10 cm. Find the curved surface area of the cylinder.

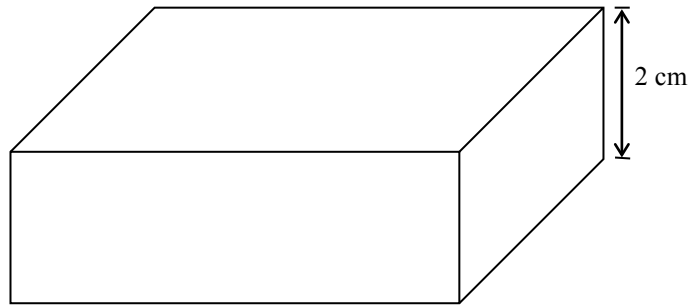
- A. $360\pi \text{ cm}^2$
- B. $460\pi \text{ cm}^2$
- C. $560\pi \text{ cm}^2$
- D. $1800\pi \text{ cm}^2$



11. In the figure, Solid A and Solid B are similar solids. Their heights are 1 cm and 2 cm respectively. The volume of Solid A is 6 cm^3 . Find the volume of Solid B .

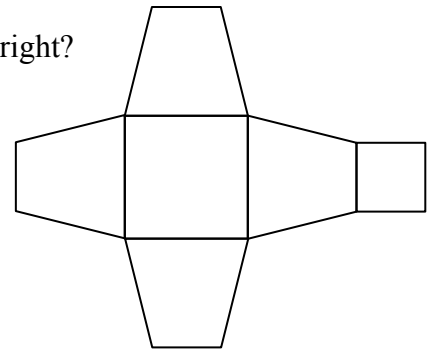


Solid A

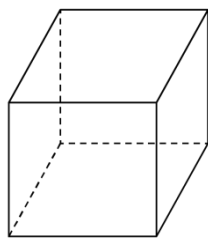


Solid B

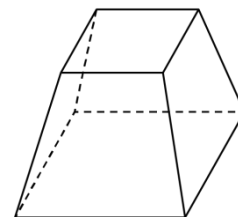
- A. 12 cm^3
 B. 18 cm^3
 C. 24 cm^3
 D. 48 cm^3
12. Which of the following 3-D figures can be made by the net on the right?



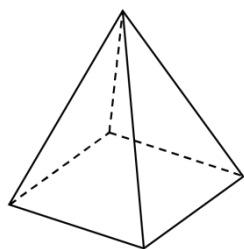
A.



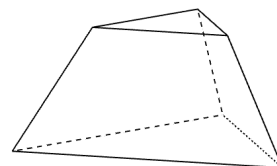
B.



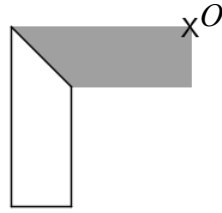
C.



D.

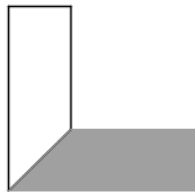


13.

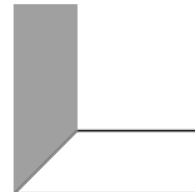


Find the image of the above figure after rotating about O through 90° in a clockwise direction.

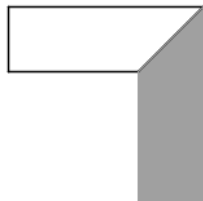
A.



B.



C.

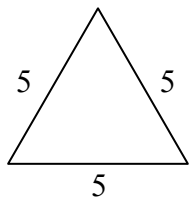
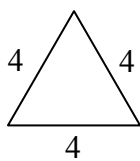


D.

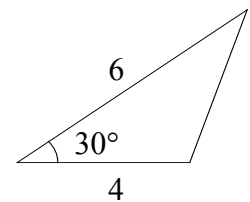
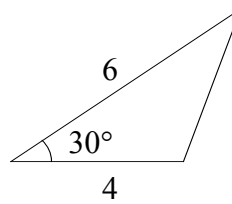


14. Which of the following pairs of triangles **MUST** be congruent?

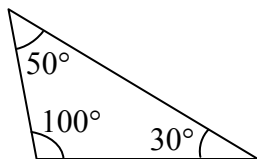
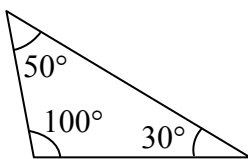
A.



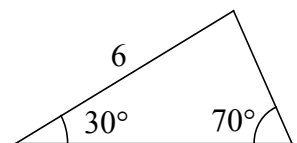
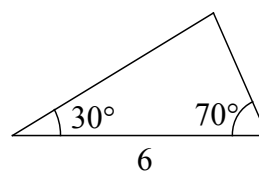
B.



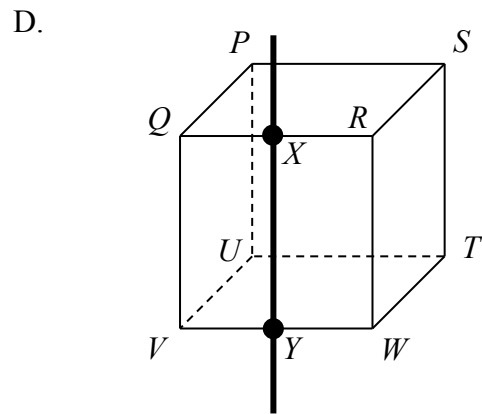
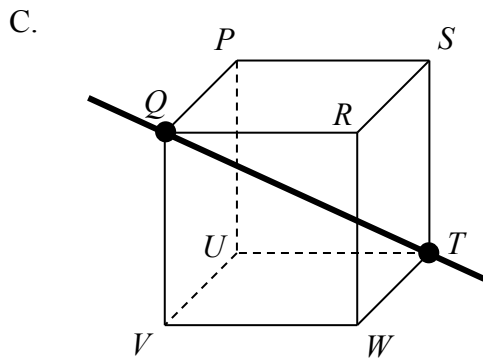
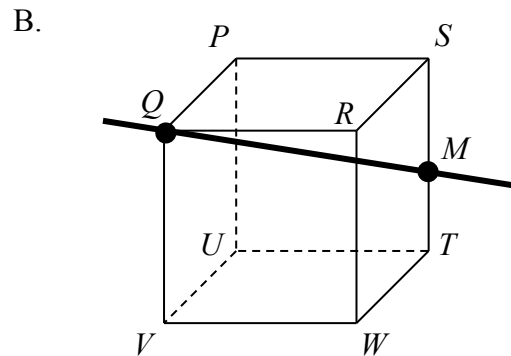
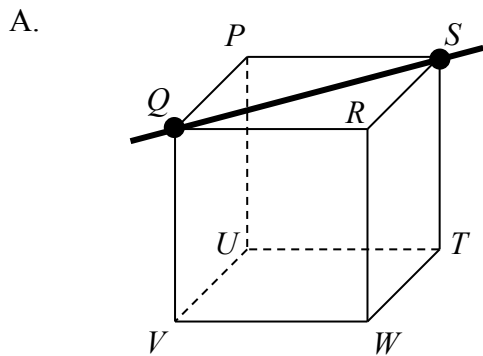
C.



D.

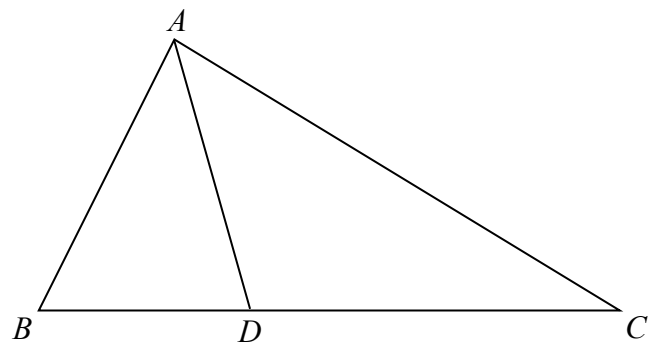


15. In the following figures, M , X and Y are the mid-points of ST , QR and VW respectively. Which thick line is an axis of rotational symmetry of cube $PQRSTUW$?



16. In $\triangle ABC$, $\angle BAD = \angle DAC$. AD **MUST** be

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

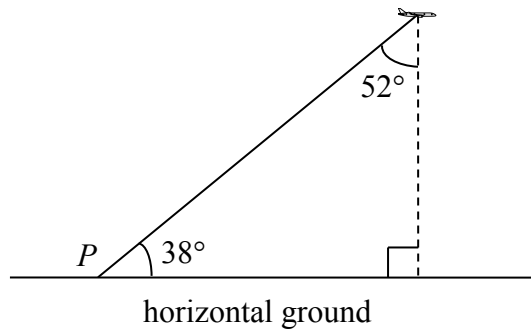


17. $A(3, 10)$ and $B(6, 15)$ are two points on a straight line L in the rectangular coordinate plane. Find the slope of L .

- A. $\frac{3}{5}$
- B. $\frac{5}{3}$
- C. $\frac{9}{25}$
- D. $\frac{25}{9}$

18. In the figure, P is a point on the horizontal ground. Find the angle of elevation of the aeroplane from P .

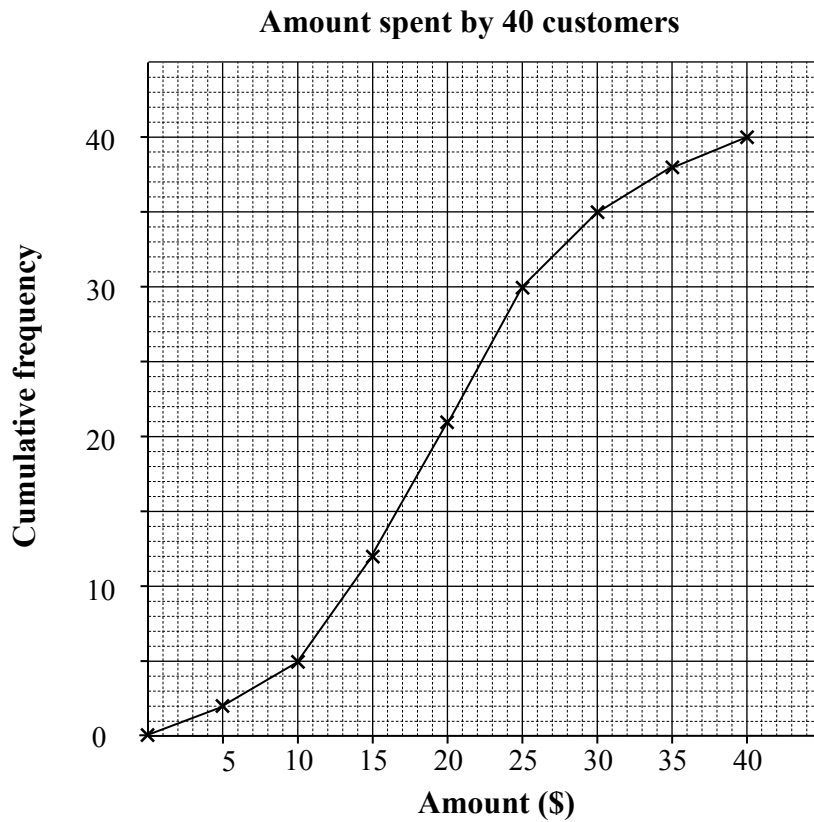
- A. 38°
- B. 52°
- C. 128°
- D. 142°



19. Mary wants to know how many traffic accidents happened in Hong Kong in 2015. Which of the following is the most suitable method?

- A. Observe and record the number of traffic accidents which happened on a road every day.
- B. Interview citizens randomly by phone.
- C. Collect the opinions of drivers through questionnaires.
- D. Search for information of the number of traffic accidents from the website of the Transport Department.

20. The cumulative frequency polygon below shows the amount spent by 40 customers in a convenience store.



If the amount spent by a customer is \$30 or above, the customer can get a pack of tissues for free. Find the number of customers who can get a pack of tissues for free.

- A. 35
- B. 25
- C. 15
- D. 5

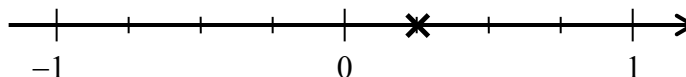
SECTION B: Write ALL the answers in the ANSWER BOOKLET.
Working need not be shown.

21. Calculate $5 - 8(-2)$.

22. Round off 35.485 9 to 3 decimal places.

23. Use the symbol 'x' to mark the number $-\frac{3}{4}$ on the number line given in the ANSWER BOOKLET.

Example: $\frac{1}{4}$ is marked on the number line below.



24. Find the values of x and y in the following Fibonacci sequence.

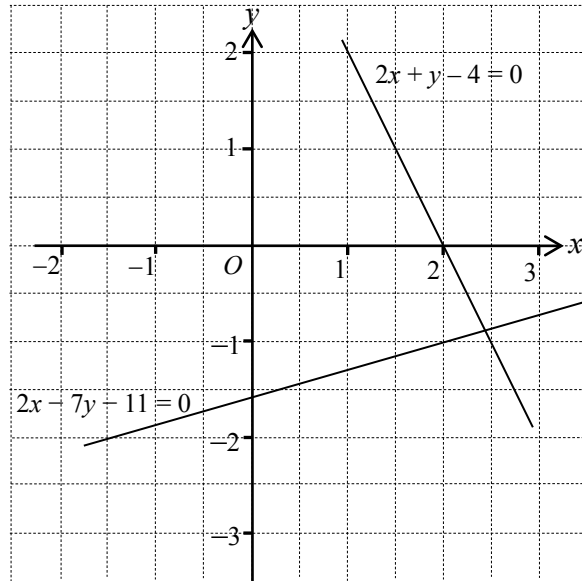
1, 1, 2, 3, 5, 8, 13, 21, x , y , ...

25. Simplify $(8x + 3) + 2x$.

26. Expand $(y - 3)(y - 5)$.

27. Factorize $1 - y^2$.

28.



The above figure shows the graphs of the equations $2x - 7y - 11 = 0$ and $2x + y - 4 = 0$.

According to the given graphs, $(2.5, -1.0)$ is the * exact solution / approximate solution

of the simultaneous equations $\begin{cases} 2x - 7y - 11 = 0 \\ 2x + y - 4 = 0 \end{cases}$.

(*Circle the correct answer in the **ANSWER BOOKLET**)

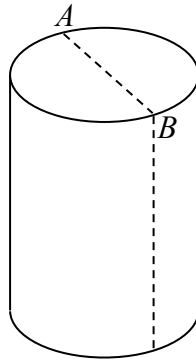
29. Make T the subject of the formula $W = 5 + \frac{T}{2}$.

30. In the **ANSWER BOOKLET**, fill in the box with $>$ or $<$ to express the relation between the numbers.

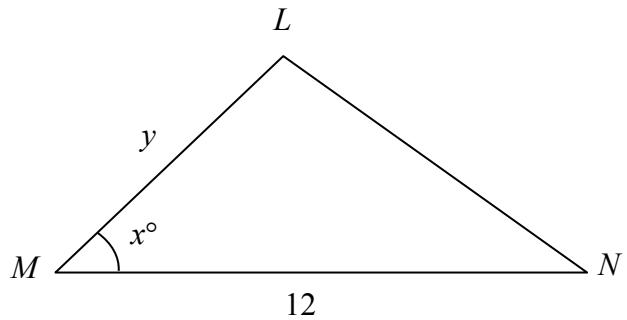
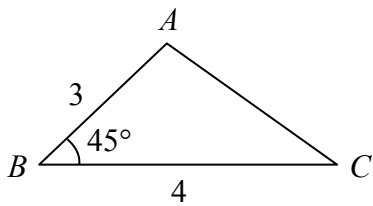
$$\frac{2015}{2016} \quad \boxed{} \quad \frac{2016}{2017}$$

31. The radius of a circle is 6 cm, find its circumference. Express the answer in terms of π .

32. A right cylinder is placed horizontally as shown. It is cut vertically along the line AB . In the ANSWER BOOKLET, sketch the cross-section obtained.



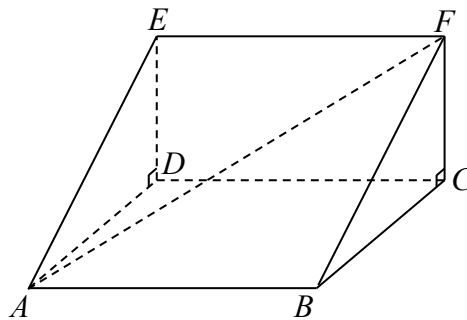
33.



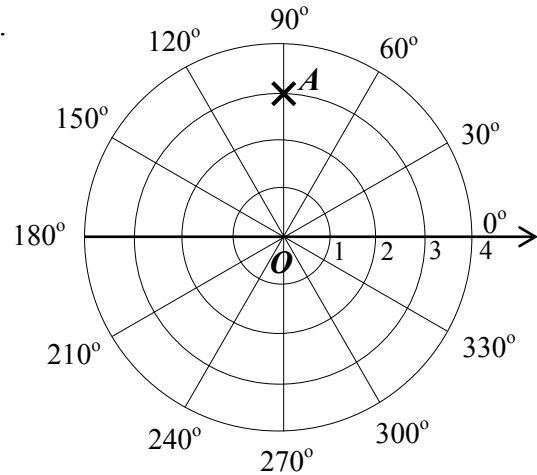
In the figure, $\triangle ABC \sim \triangle LMN$. Find

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

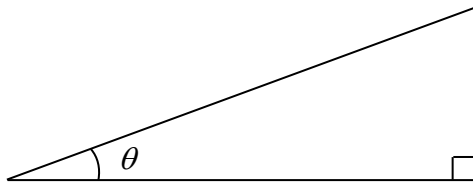
34. The figure shows a triangular prism. $ABCD$ and $CFED$ are rectangles. $ABCD$ is a horizontal plane and $CFED$ is a vertical plane. Name the angle between AF and the plane $ABCD$.



35. Find the polar coordinates of point A in the figure.



36. In the figure, $\cos \theta = 0.92$. Find θ . (Correct to the nearest degree)



37. Tony is doing a survey to analyse the sleeping habits of Secondary Three students. The survey is conducted in the following four stages.

- (1) According to the organised data, construct suitable charts.
- (2) Give questionnaires about sleeping habits to the Secondary Three students.
- (3) Collect the questionnaires and organise the data obtained.
- (4) Analyse the data and the charts to draw conclusions.

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

38. The stem-and-leaf diagram below shows the hourly wages (\$) of part-time staff at a restaurant:

Hourly wage of part-time staff

Stem (\$10)	Leaf (\$1)
3	5 5 5 5
4	0 0 0 3 3
5	2 2 8
6	5 5 5

According to the above stem-and-leaf diagram, answer the following questions.

- (a) How many part-time staff are there at the restaurant?
- (b) Find the median of the hourly wages of the part-time staff.
- (c) It is given that only the 4 part-time staff with the highest hourly wages are cooks. Among these 4 part-time cooks, how much is the lowest hourly wage?

39. The table below shows the number of books borrowed from the school library by 200 students in the first term.

Number of books	0 – 9	10 – 19	20 – 29	30 – 39	40 – 49
Frequency	27	56	78	32	7

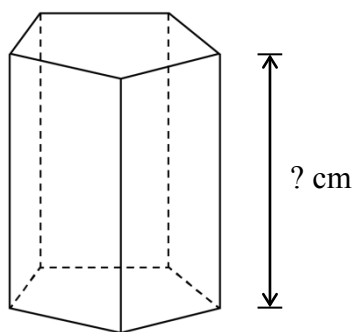
From the above information, find the modal class of the number of books borrowed.

SECTION C: All working must be clearly shown.

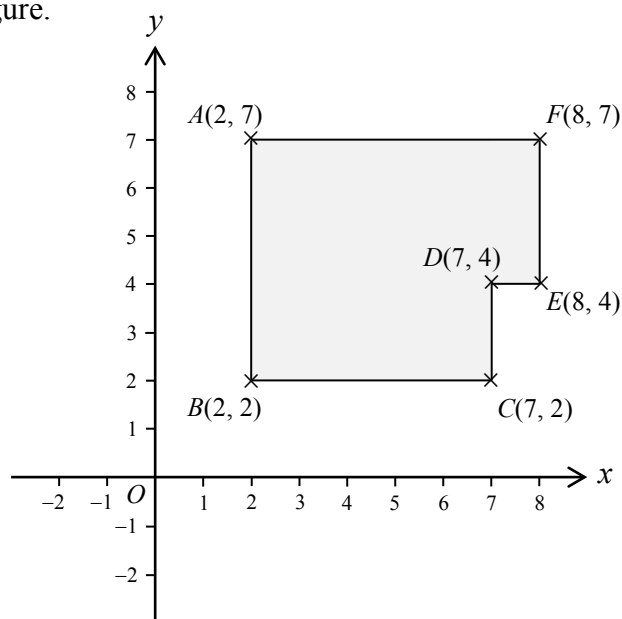
Write the mathematical expressions, answers and statements/conclusions in the spaces provided in the ANSWER BOOKLET.

40. Joseph deposits \$4 650 in a bank at a simple interest rate of 3% p.a. Find the amount he will receive after 2 years.

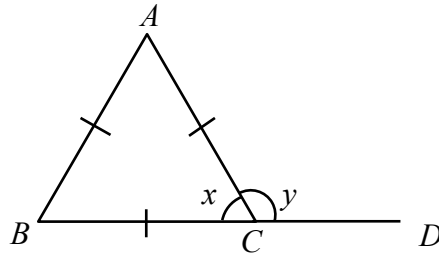
41. The figure shows a right prism. Its base area is 30 cm^2 and its volume is 240 cm^3 . Find the height of the prism.



42. Find the area of the polygon $ABCDEF$ in the figure.



43. In the figure, $\triangle ABC$ is an equilateral triangle. BCD is a straight line. Find x and y .



44. Complete the table for the equation $3x + 2y - 6 = 0$ in the **ANSWER BOOKLET**.

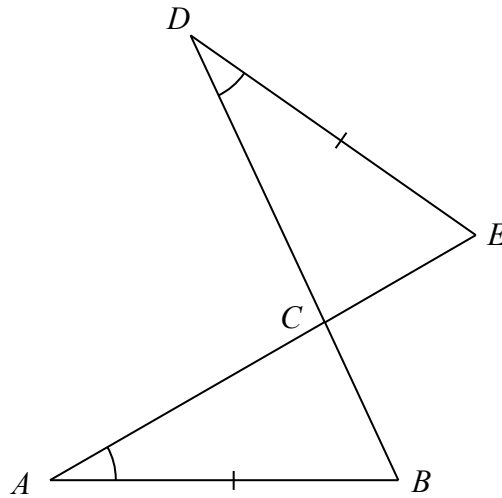
x	y
-2	6
0	
4	

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

45. A theatre has 22 rows of seats, and each row has 41 seats. Estimate the number of seats in this theatre and judge whether the theatre has enough seats for 800 people.

Based on the description above, give an approximation for each of the **UNDERLINED VALUES** respectively. Use these 2 approximations for estimation and briefly explain your estimation method.

46. In the figure, AE and BD intersect at C , $\angle CAB = \angle CDE$ and $AB = DE$.
 Prove that $\triangle ABC \cong \triangle DEC$.



47. The table below shows the capacities of 20 bottles.

Capacities (mL)	Class boundaries (mL)	Class mark (mL)	Frequency
200 – 290	195 – 295	245	3
300 – 390		345	6
400 – 490	395 – 495		7
500 – 590	495 – 595	545	4

- (a) According to the above table, complete the frequency distribution table in the **ANSWER BOOKLET**.
- (b) Draw a histogram to represent the above data.

END OF PAPER

