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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	=	$2\pi rh$
	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. An alloy weighs 2 095 g and it is made of two metals, copper and tin. The alloy is composed of 78% copper and 22% tin by weight. Which of the following expressions and results obtained can estimate reasonably the weight of copper in the alloy?

A. $3\,000\text{ g} \times 0.8 = 2\,400\text{ g}$

B. $3\,000\text{ g} \times 0.2 = 600\text{ g}$

C. $2\,000\text{ g} \times 0.8 = 1\,600\text{ g}$

D. $2\,000\text{ g} \times 0.2 = 400\text{ g}$

2. Which of the following is correct?

A. $\sqrt{99} > 9$

B. $\sqrt{63} > 8$

C. $\sqrt{14} > 7$

D. $\sqrt{7} > 6$

3. On a farm, there are 24 cows and some pigs. The number of pigs is greater than that of cows by 16 . Find the ratio of the number of cows to the number of pigs.

A. 3 : 1

B. 3 : 2

C. 3 : 5

D. 5 : 3

4. Miss Chan bought N dozens of pencils. After she took away 3 pencils, the remaining could be equally divided among p students. How many pencils could each student get?

A. $\dfrac{12(N-3)}{p}$

B. $\dfrac{12N-3}{p}$

C. $\dfrac{12N}{p}-3$

D. $\dfrac{N-3}{p}$

5. $5^{-3}=$

A. $\dfrac{1}{15}$.

B. $\dfrac{1}{125}$.

C. –15.

D. –125.

6. Determine whether each of the following is factorization or expansion.

(i)	$3x^3-4x^2-5x+2$ $=(3x-1)(x-2)(x+1)$
(ii)	$(3x-1)(x-2)(x+1)$ $=3x^3-4x^2-5x+2$

A. (i) Expansion (ii) Expansion

B. (i) Expansion (ii) Factorization

C. (i) Factorization (ii) Expansion

D. (i) Factorization (ii) Factorization

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. If $x \le y$, which of the following inequalities **MUST** be correct?

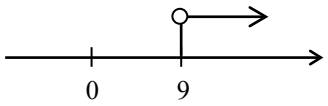
A. $\frac{x}{5} \ge \frac{y}{5}$

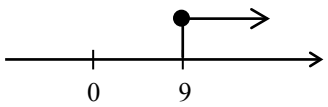
B. $x+5 \ge y+5$

C. $5x \ge 5y$

D. $-5x \ge -5y$

9. Which of the following diagrams represents $x > 9$?

A.


B.


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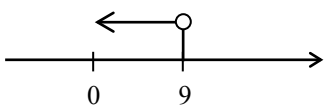

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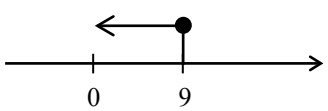

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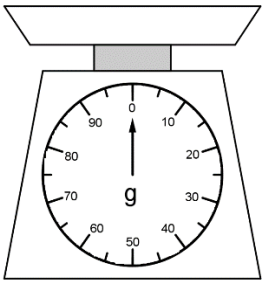
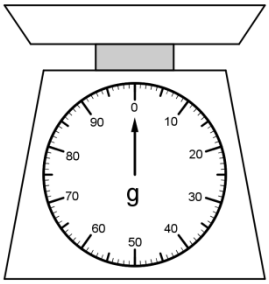


Scale A



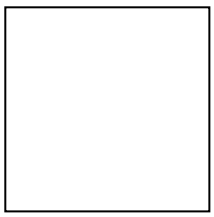
Scale B

The above figure shows Scale A and Scale B with different graduations. Mary wants to find the weight of a paper clip . Which of the following methods is the best?

A. Mary uses scale A to measure the weight of a paper clip.
B. Mary uses scale B to measure the weight of a paper clip.
C. Mary uses scale A to measure the total weight of 20 paper clips and then divides the total weight by 20 .
D. Mary uses scale B to measure the total weight of 20 paper clips and then divides the total weight by 20 .

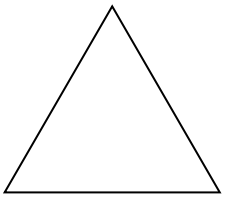
11. Choose the figure which has exactly 3 axes of symmetry.

A. Square

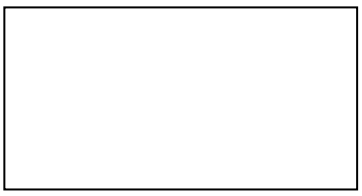


B. Trapezium

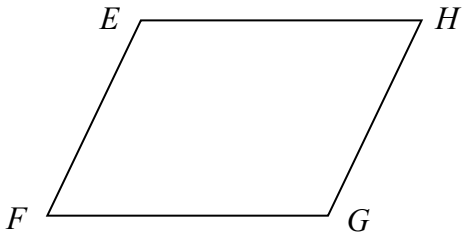
C. Equilateral triangle



D. Rectangle



12. Which of the following represents the parallelogram as shown?



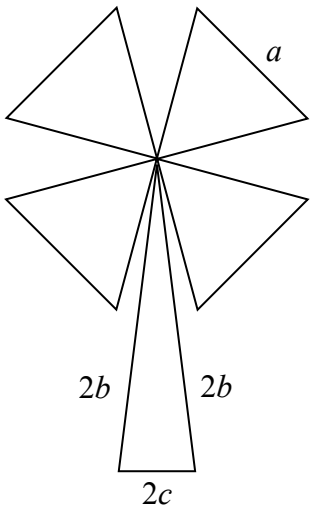
A. $EFGH$

B. $\angle EFG$

C. EF

D. E

13.



The above figure is formed by 4 identical equilateral triangles and one isosceles triangle. The length of each side of the equilateral triangles is a, while the lengths of the sides of the isosceles triangle are $2b$, $2b$ and $2c$.

By considering the **dimensions**, determine which of the following could express the area of the above figure.

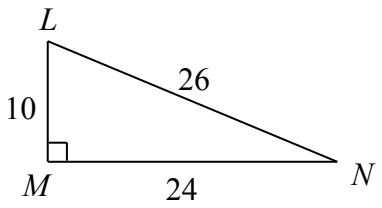
A. $4a^3 + 8b^2c$

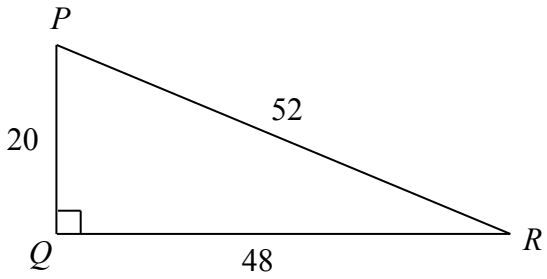
B. $\sqrt{3}a^2 + c\sqrt{4b^2 - c^2}$

C. $12a + 4b + 2c$

D. $\dfrac{\sqrt{6}+\sqrt{2}}{4}a + \sqrt{4b^2 - c^2}$

14.





According to the figures above, which of the following is correct?

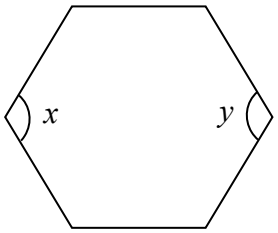
A. $\triangle LMN \sim \triangle PQR$ (SAS)

B. $\triangle LMN \sim \triangle PQR$ (SSS)

C. $\triangle LMN \sim \triangle PQR$ (RHS)

D. $\triangle LMN \sim \triangle PQR$ (3 sides proportional)

15. In the figure, x and y are



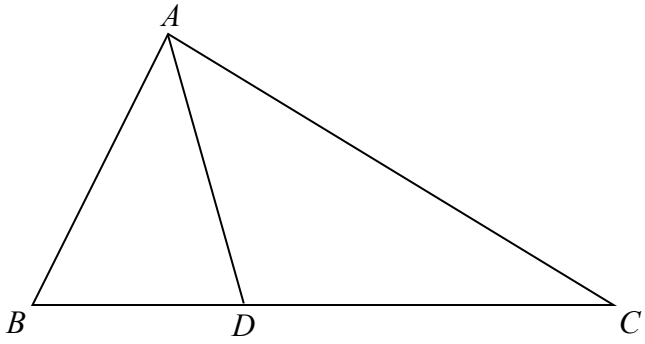
A. exterior angles of the hexagon.

B. interior angles of the hexagon.

C. vertically opposite angles.

D. corresponding angles.

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.

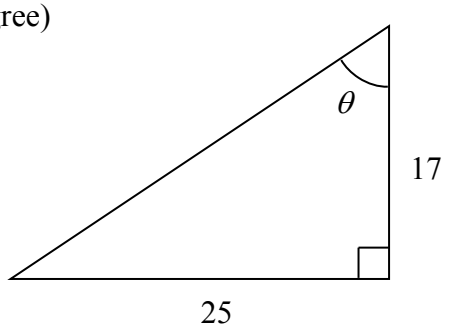
A. $\frac{3}{5}$

B. $\frac{5}{3}$

C. $\frac{9}{25}$

D. $\frac{25}{9}$

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



A. 56°

B. 47°

C. 43°

D. 34°

Go on to the next page

19. Tony held an election for 'My favourite restaurant' on a website. The table below shows the number of votes obtained by each restaurant.

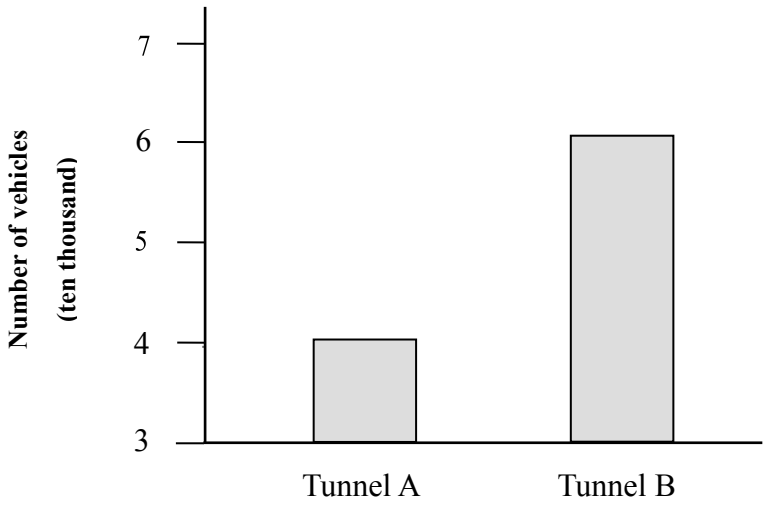
Restaurant	A	B	C	D	E
Number of votes	107	81	23	54	69

Which of the following is the most suitable for presenting the data above?

A. Bar chart
B. Stem-and-leaf diagram
C. Scatter diagram
D. Broken line graph

20. The diagram below shows the average daily traffic volume of 2 tunnels. After reading the following diagram, Mr Chan believes that the number of vehicles using Tunnel B is 3 times that using Tunnel A.

Average daily traffic volume of Tunnel A and Tunnel B



Which of the following statements is the best reason that Mr Chan was misled by the above diagram?

A. The types of vehicles using the tunnels are not shown in the diagram.
B. The average daily traffic volumes of other tunnels are not shown in the diagram.
C. The date for collecting the data in the diagram is not indicated.
D. The vertical scale in the diagram does not start from 0.

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

21. The following figure shows the floor guide of a shopping mall. The mall is a 4-storey building. Under the ground floor, there are 2 floors of basement.
If -1 represents B1 and $+2$ represents 2/F, use a directed number to represent each of the following floors:

(i) 3/F
(ii) B2

Floor Guide

3/F	Furniture
2/F	Children's wear
1/F	Men's wear
G/F	Women's wear
B1	Supermarket
B2	Car park

22. The download speed of a broadband network can reach 910 000 bytes per second. Use scientific notation to represent this speed.

23. In a school, the ratio of the number of boy scouts to the number of girl guides is $5 : 8$. If the number of boy scouts is 30, find the number of girl guides.

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

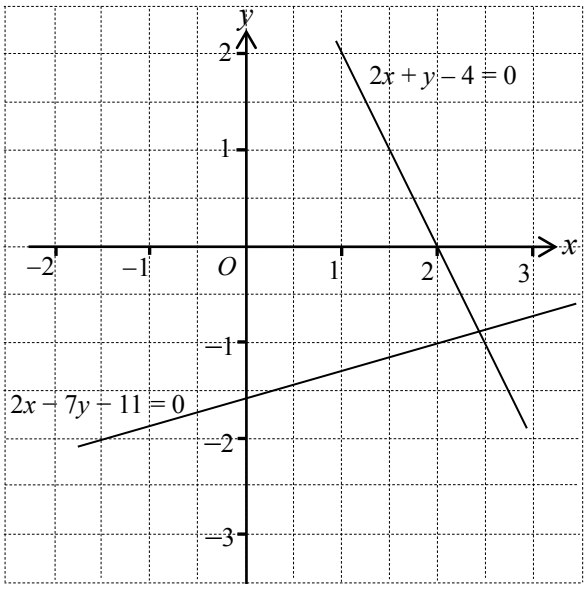
$1,\ 1,\ 2,\ 3,\ 5,\ 8,\ 13,\ 21,\ x,\ y, \ldots$

25. Find the coefficient of y in the polynomial $5y^2 - 8y + 4$.

26. Expand $y(y^2 + y + 2)$.

27. Factorize $2x^2 - x - 1$.

28.



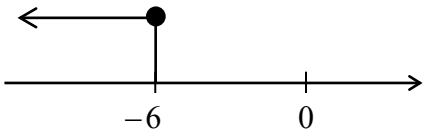
The above figure shows the graphs of the equations $2x-7y-11=0$ and $2x+y-4=0$.

According to the given graphs, (2.5 , –1.0) is the * exact solution / approximate solution of the simultaneous equations $\begin{cases}2x-7y-11=0\\2x+y-4=0\end{cases}$.

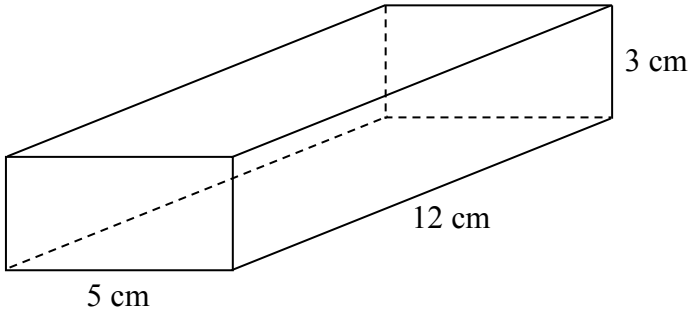
(*Circle the correct answer in the **ANSWER BOOKLET**)

29. Expand $(a+8)^2$.

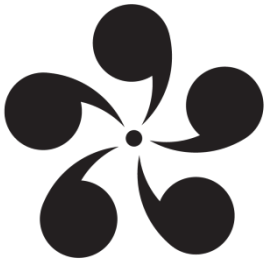
30. According to the diagram, write down an inequality in x.



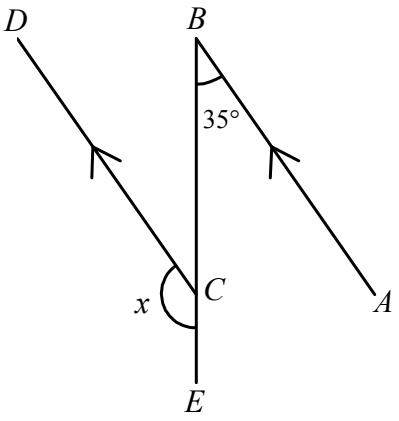
31. The length, width and height of a solid cuboid are 12 cm , 5 cm and 3 cm respectively. Find the total surface area of the cuboid.



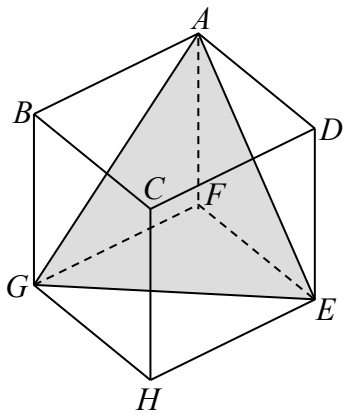
32. The figure below has rotational symmetry. Find its order of rotational symmetry.

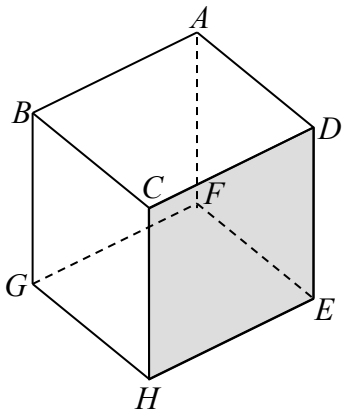


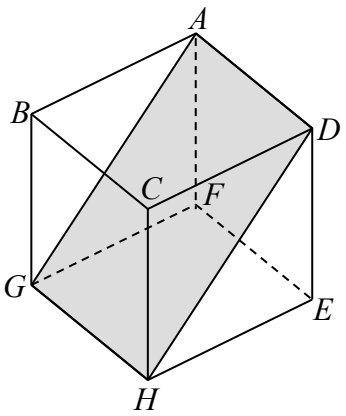
33. In the figure, BCE is a straight line, $AB // CD$ and $\angle ABC = 35°$. Find x.



34. The following shaded regions are three planes, namely, AGE, $CHED$ and $AGHD$. **ONE** of them is a plane of reflectional symmetry of the cube $ABCDEFGH$, name this plane.

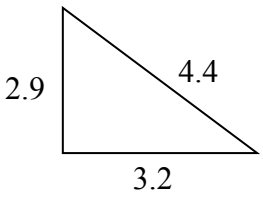




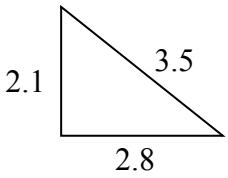


35. Which of the following must be right-angled triangle(s)? (May be more than one answer)

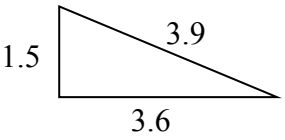
Triangle *A*



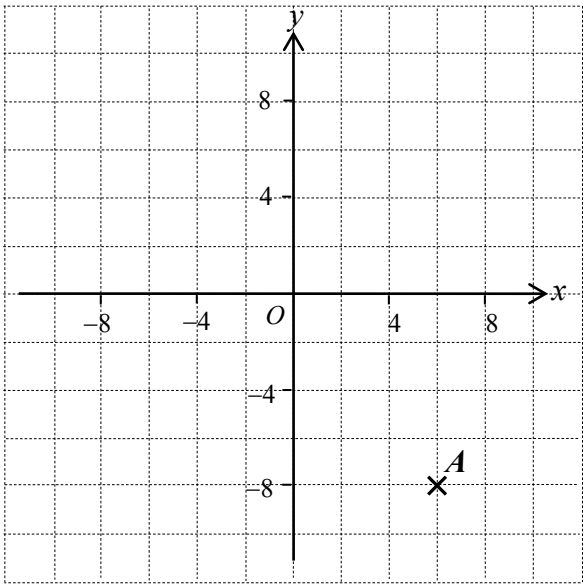
Triangle *B*



Triangle *C*



36. Find the coordinates of point ***A*** in the figure.

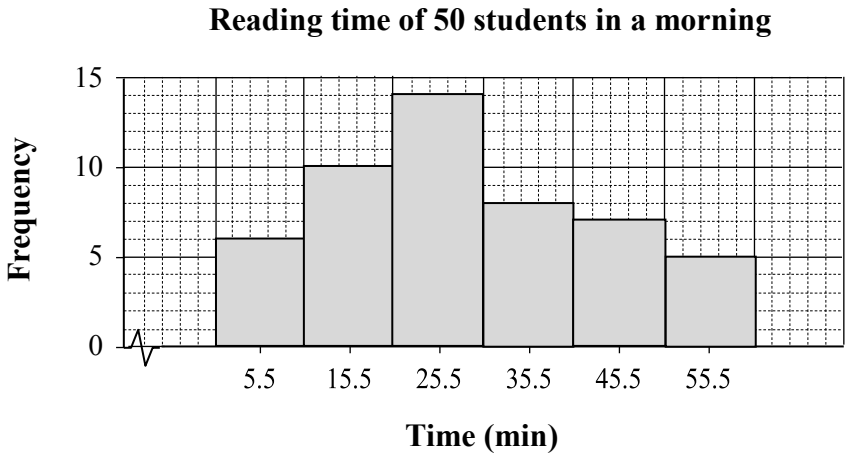


37. Determine whether each of the following data is discrete or continuous.

(i) The number of playgrounds in each district of Hong Kong

(ii) The area of each playground in Hong Kong

38. The histogram below shows the reading time (min) of 50 students in a morning.



According to the above histogram, answer the following questions.

(a) Complete the frequency distribution table in the **ANSWER BOOKLET**.

(b) How many students whose reading time is less than 30.5 minutes are there?

(c) In order to encourage students to read, a student whose reading time is 40.5 minutes or above can get a bookmark. How many students can get bookmarks?

39. A bag contains marbles of different colours. A marble is randomly drawn from the bag and put back into the bag after recording its colour.
The outcomes of 100 draws of the marbles are shown in the table below.

Colour of marble	Black	White	Blue
Frequency	23	31	46

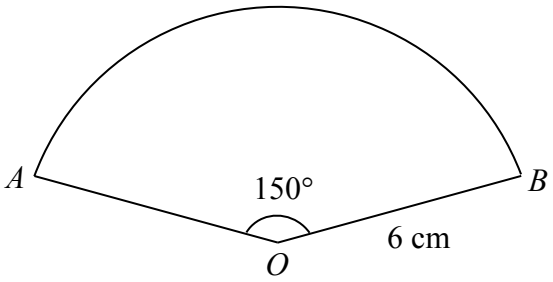
What is the empirical probability of drawing a white marble from the bag?

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

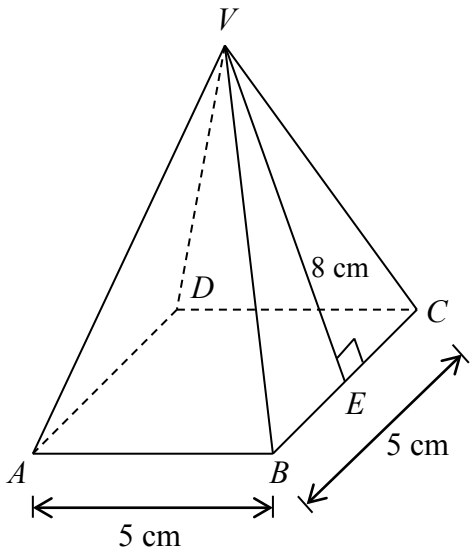
40. Joseph deposits \$4 650 in a bank at a simple interest rate of 3% p.a. Find the amount he will receive after 2 years.

41. Tommy drives from city A to city B at an average speed of 60 km/h. The travelling distance is 180 km. How many hours does he take to arrive at city B ?

42. In the figure, the radius of sector OAB is 6 cm and $\angle AOB = 150°$. Find the area of the sector. Give the answer correct to the nearest $0.1\ \text{cm}^2$.



43. In the figure, $VABCD$ is a solid right pyramid. The base $ABCD$ is a square and the length of each side is 5 cm. The height of $\triangle VBC$ is 8 cm. Find the total surface area of the pyramid.



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

x	y
–2	6
0	
4	

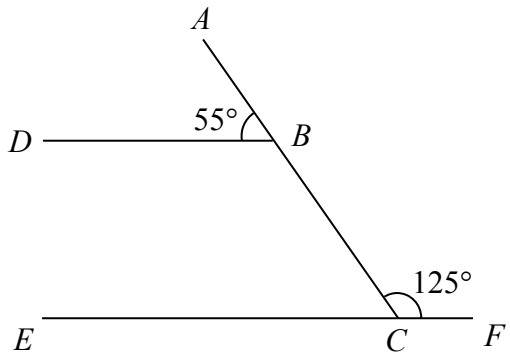
According to the table, draw the graph of this equation on the rectangular coordinate plane given in the **ANSWER BOOKLET**.

45. Tom is a basketball player. In the past 5 competitions, he got the following scores:

6, 10, 8, 12, 42

It is given that the mean score of Tom in the 5 competitions is 15.6.
Hence Tom said, 'My score was higher than 15 in more than half of these 5 competitions.'
Do you agree with Tom's saying? Explain your answer.

46. In the figure, ABC and ECF are straight lines. $\angle ABD = 55°$ and $\angle ACF = 125°$. Prove that $BD \parallel FE$.



47. Solve the simultaneous equations $\begin{cases} y = 2x + 4 \\ x + y = 19 \end{cases}$.

END OF PAPER

Do not write on this page.

Answers written on this page will not be marked.

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