

<b>9</b>	<b>M</b>	<b>E</b>	<b>4</b>	<b>(</b>	<b>Q</b>	<b>)</b>
----------	----------	----------	----------	----------	----------	----------

**Education Bureau**  
**Territory-wide System Assessment 2018**  
**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.

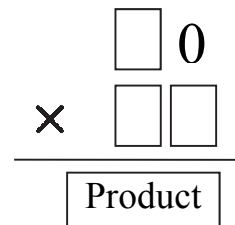
## FORMULAS FOR REFERENCE

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. It is given that the unit digit of a two-digit number is 0. It is now multiplied by another two-digit number. Which of the following can be the product?

- A. 90
- B. 508
- C. 750
- D. 10 000



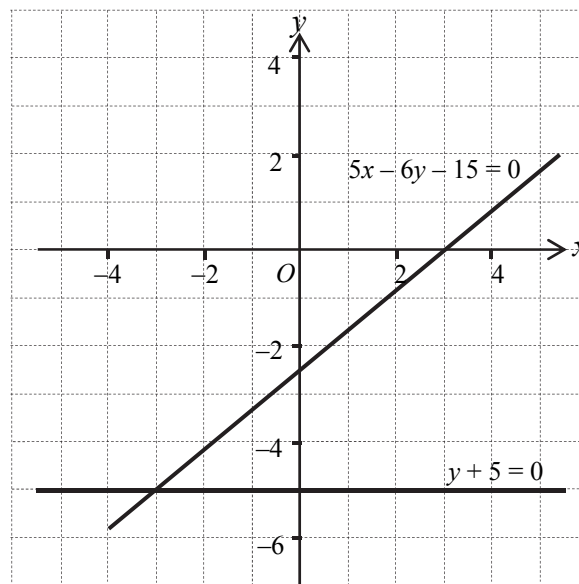
2. A television weighs  $x$  kg. The weight of a refrigerator is 7 kg more than 4 times the weight of the television. Their total weight is 82 kg. Which of the following equations can be used to find the value of  $x$ ?

- A.  $x + 4x - 7 = 82$
- B.  $x + \frac{x}{4} + 7 = 82$
- C.  $x + 4(x + 7) = 82$
- D.  $x + 4x + 7 = 82$

3. Which of the following is an equation with the root 20?

- A.  $x + 20 = 0$
- B.  $20x - 1 = 0$
- C.  $\frac{x}{20} - 1 = 0$
- D.  $\frac{x}{20} + 1 = 0$

4.



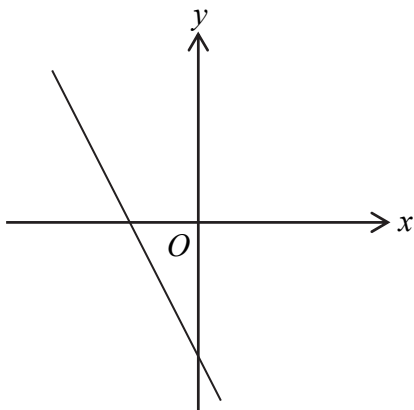
The above figure shows the graphs of  $5x - 6y - 15 = 0$  and  $y + 5 = 0$ .

According to the given graphs, solve the simultaneous equations  $\begin{cases} 5x - 6y - 15 = 0 \\ y + 5 = 0 \end{cases}$  graphically.

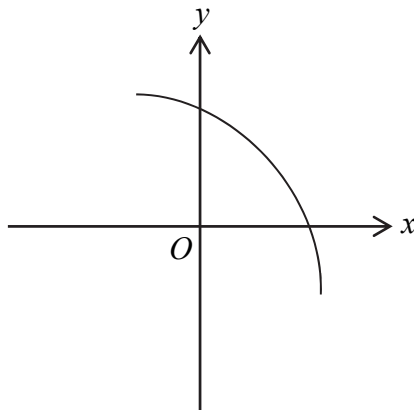
- A.  $(3, 0)$
- B.  $(0, -5)$
- C.  $(-3, -5)$
- D.  $(-5, -3)$

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

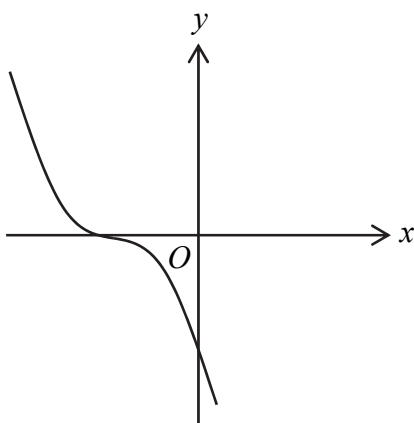
A.



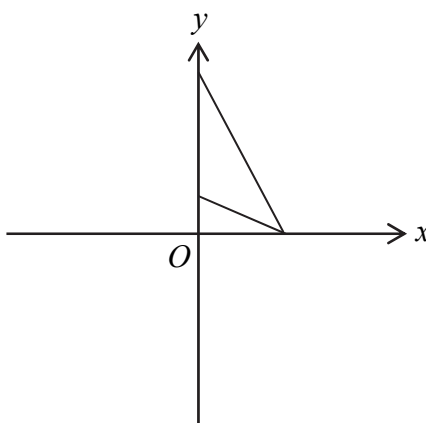
B.



C.



D.



6. The adult fare of a bus route is  $\$x$ . The child fare is half of the adult fare. If the total fare of 4 adults and 3 children is more than  $\$37$ , which of the following inequalities can be used to find the range of values of  $x$ ?

A.  $4x + 3\left(\frac{x}{2}\right) > 37$

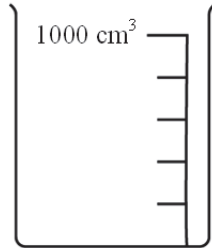
B.  $4x + 3\left(\frac{x}{2}\right) < 37$

C.  $4x + 3\left(x - \frac{1}{2}\right) > 37$

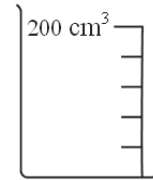
D.  $4x + 3\left(x - \frac{1}{2}\right) < 37$

7. Connie measures the volume of orange juice obtained by squeezing an orange. Which of the following containers can give a more accurate measurement?

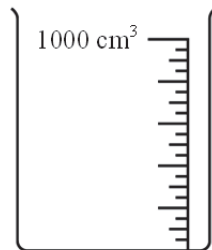
A.



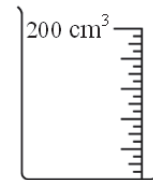
B.



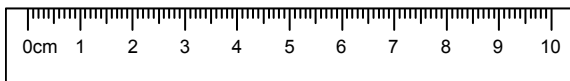
C.



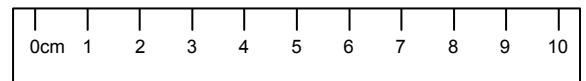
D.



8.



Ruler *A*

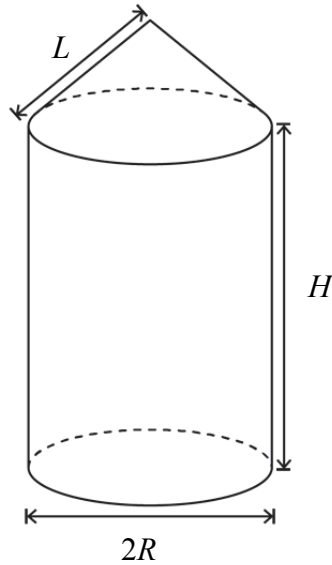


Ruler *B*

The above figure shows Ruler *A* and Ruler *B* with different graduations. Betty wants to find the thickness of a twenty-dollar note. Which of the following methods is the best?

- A. Betty uses Ruler *A* to measure the thickness of 40 twenty-dollar notes and then divides the thickness by 40.
- B. Betty uses Ruler *B* to measure the thickness of 40 twenty-dollar notes and then divides the thickness by 40.
- C. Betty uses Ruler *A* to measure the thickness of a twenty-dollar note.
- D. Betty uses Ruler *B* to measure the thickness of a twenty-dollar note.

9.



The solid in the figure is formed by a right cylinder and a right circular cone. The base diameter and height of the cylinder are  $2R$  and  $H$  respectively. The base diameter and slant height of the cone are  $2R$  and  $L$  respectively.

By considering the **dimensions**, which of the following could be expressed by  $\frac{1}{3}\pi R^2\sqrt{L^2 - R^2} + \pi R^2 H$ ?

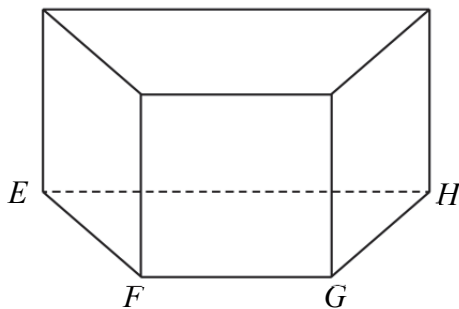
- A. Volume of the solid
- B. Total surface area of the solid
- C. Curved surface area of the solid
- D. Height of the solid

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

(i)	$(2x+3)(x-1)(x+4)$ $= 2x^3 + 9x^2 + x - 12$
(ii)	$2x^3 + 9x^2 + x - 12$ $= (2x+3)(x-1)(x+4)$

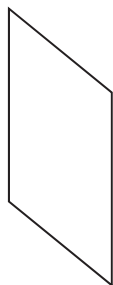
- A. (i) Expansion                      (ii) Expansion
- B. (i) Expansion                      (ii) Factorization
- C. (i) Factorization                      (ii) Expansion
- D. (i) Factorization                      (ii) Factorization

11. A right prism is placed horizontally as shown. Its base  $EFGH$  is a trapezium. Michael sketches a cross-section which is parallel to the base.



Which of the following could express the plane diagram of the cross-section?

A.



B.



C.



D.

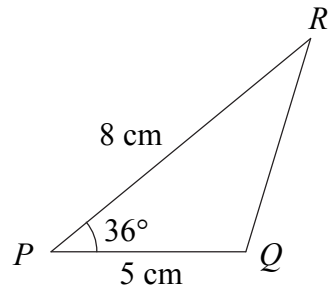


12. Which of the following polynomials has like terms?

- A.  $4a + 4b$
- B.  $2a^2 + 3a$
- C.  $3a^2b - 7ab^2$
- D.  $8ab + 5ab$

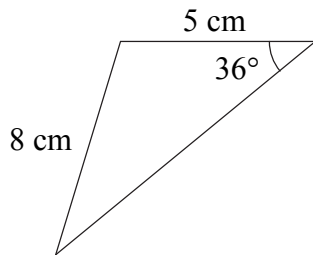


13.

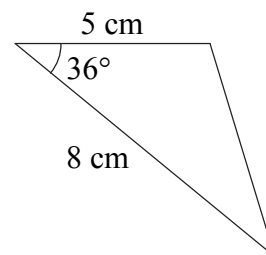


Which of the following triangles is congruent to the  $\triangle PQR$  as shown in the above figure?

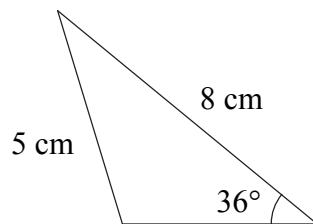
A.



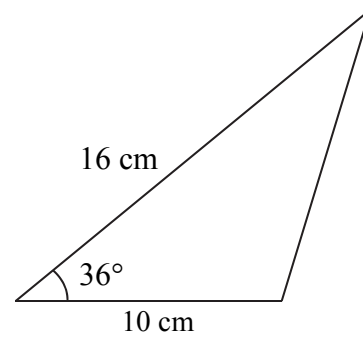
B.



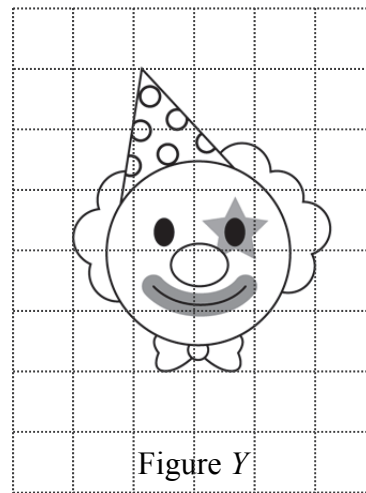
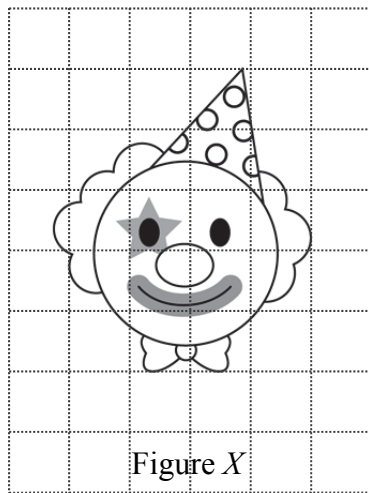
C.



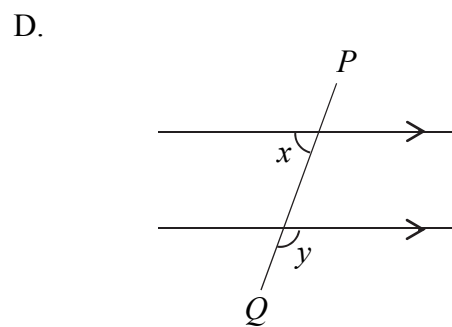
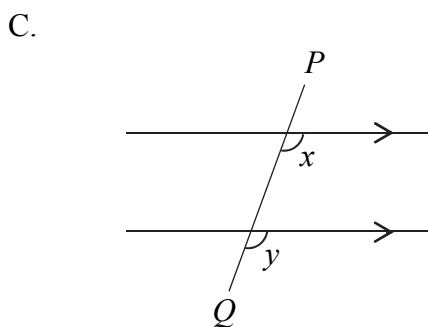
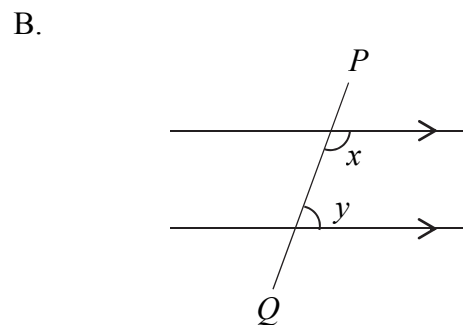
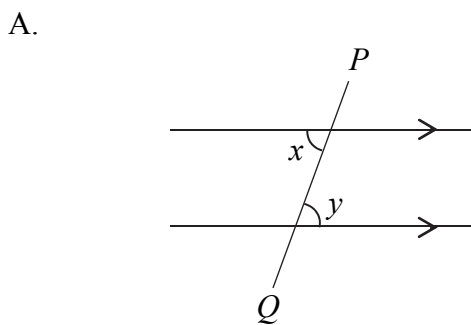
D.



14. Figure  $X$  is changed to Figure  $Y$  after a single transformation. What is the corresponding transformation?

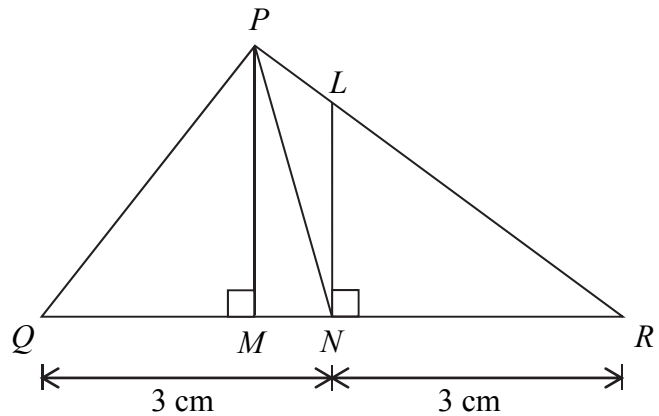


- A. Rotation  
 B. Enlargement  
 C. Reflection  
 D. Translation
15. In each of the following figures,  $PQ$  is a straight line. Which figure shows that  $x$  and  $y$  are a pair of interior angles on the same side of a transversal?



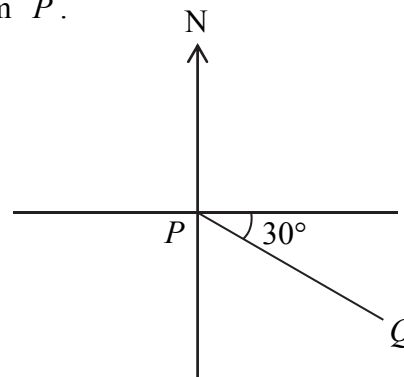
16. In the figure,  $PLR$  and  $QMNR$  are straight lines. Consider  $\triangle PQR$ ,  $QN = NR = 3$  cm.  $PM \perp QR$  and  $LN \perp QR$ . Which of the following is a median of  $\triangle PQR$ ?

- A.  $LN$
- B.  $PN$
- C.  $PM$
- D.  $QM$



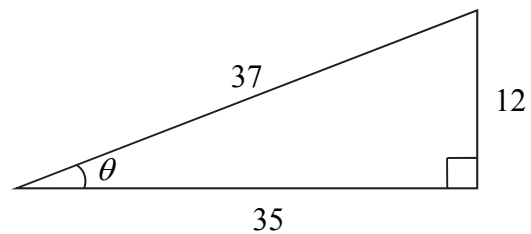
17. Referring to the figure, find the bearing of  $Q$  from  $P$ .

- A.  $030^\circ$
- B.  $060^\circ$
- C.  $120^\circ$
- D.  $240^\circ$



18. Find the value of  $\tan \theta$  in the figure.

- A.  $\frac{12}{35}$
- B.  $\frac{35}{12}$
- C.  $\frac{12}{37}$
- D.  $\frac{35}{37}$



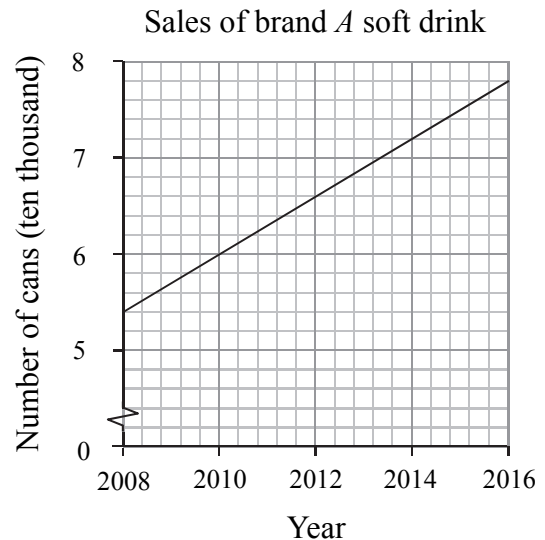
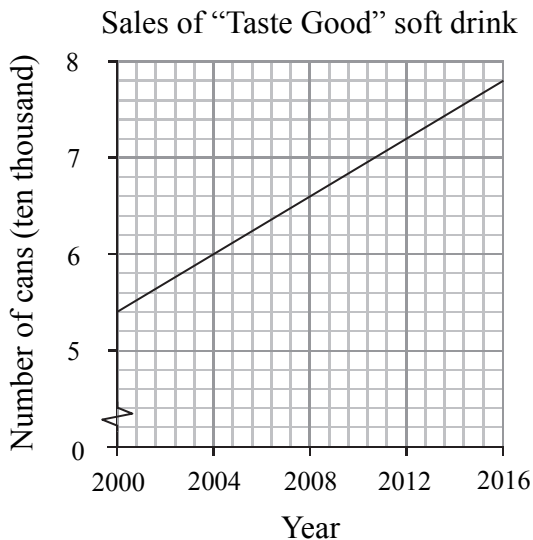
19. The table below shows the heights and weights of 10 students.

Student	A	B	C	D	E	F	G	H	I	J
Height (cm)	170	152	164	173	156	185	162	177	165	180
Weight (kg)	57	48	53	62	52	74	56	66	57	71

Mr. Chan wants to use a statistical graph to find out whether the heights and weights are related to each other. Which of the following is the most suitable for presenting the data above?

- A. Pie chart
- B. Stem-and-leaf diagram
- C. Cumulative frequency polygon
- D. Scatter diagram

20. A sales officer of “Taste Good” soft drink uses the diagrams below to show the sales of “Taste Good” soft drink and brand *A* soft drink.



Mr. Chan is the general manager of “Taste Good” soft drink. Based on the diagrams above, he believes that the sales of the two brands of soft drinks are increasing at the same rate.

Which of the following statements is the best reason that Mr. Chan is **misled** by the above diagrams?

- A. The sales of other brands of soft drinks are not shown.
- B. The prices of the two brands of soft drinks are not shown.
- C. The scales of the 2 vertical axes are not the same.
- D. The scales of the 2 horizontal axes are not the same.

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

21. Calculate  $\frac{-3}{-9+(-3)}$ .

22. Write down the number of terms of the polynomial  $8y^3 + 12y^2 + 5y - 27$ .

23. How many positive integers are less than  $\sqrt{20}$  ?

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

$$-2, 6, -18, 54, x, y, \dots$$

25. Expand  $6x(x + y - 3)$ .

26. Factorize  $5x^2 + 15xy$ .

27. Make  $B$  the subject of the formula  $A = 12 - 5B$ .

28. Solve the equation  $8(x + 1) = 7(x - 1)$ .

29. Consider the formula  $a = \frac{v^2}{r}$ . If  $a = 4$  and  $v = 6$ , find the value of  $r$ .

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



31. The figures below have reflectional symmetry. Which two figures have the same number of axes of symmetry?



Figure *M*

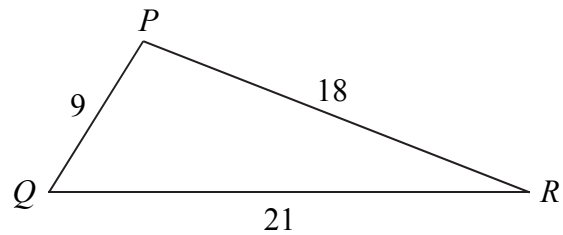
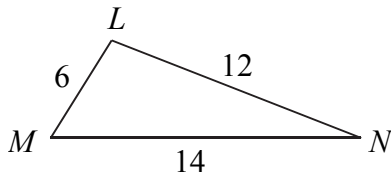


Figure *I*



Figure *X*

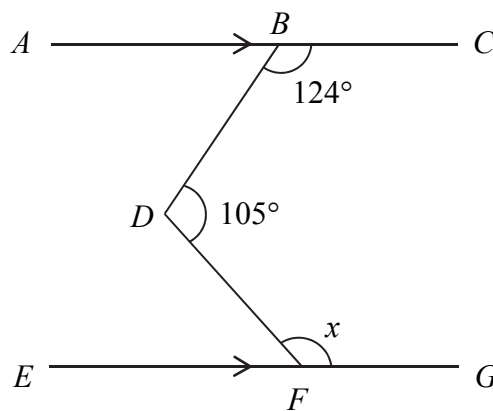
32.



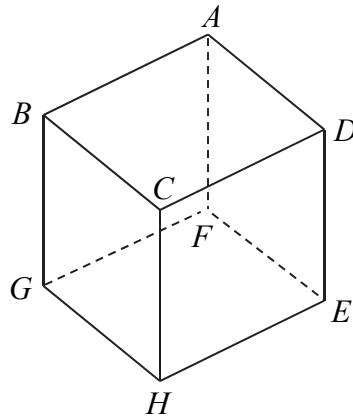
According to the given information in the above figure,

- identify whether  $\triangle LMN$  and  $\triangle PQR$  are congruent or similar triangles, and
- choose the correct reason.

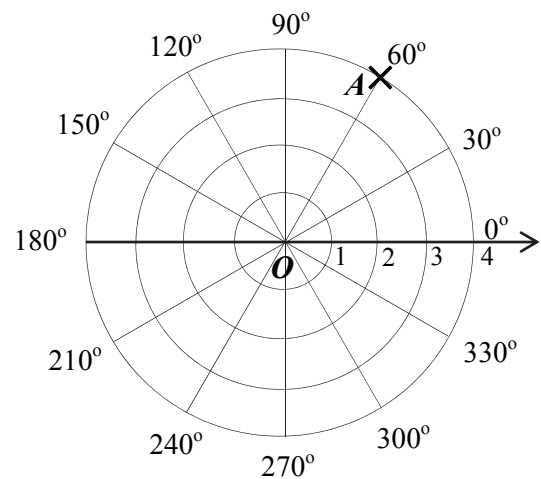
33. In the figure,  $ABC$  and  $EFG$  are a pair of parallel lines.  $\angle CBD = 124^\circ$  and  $\angle BDF = 105^\circ$ . Find  $x$ .



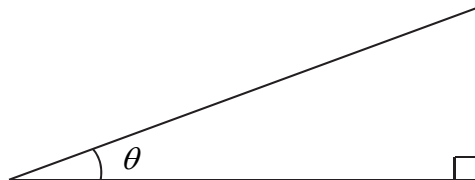
34. The figure shows a cube  $ABCDEFGH$ . By using the vertices in the figure, name the angle between the plane  $ABHE$  and the vertical plane  $CHED$ .



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



36. In the figure,  $\sin \theta = 0.37$ . Find  $\theta$ . (Correct to 3 significant figures)



37. The following data show the high jump results (correct to the nearest cm) of 15 students on Sports Day.

112	123	138	121	131
132	128	130	119	133
125	114	136	127	135

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

38. The stem-and-leaf diagram below shows the distribution of the ages of the workers in a company:

**Ages of the workers in a company**

Stem (10)	Leaf (1)
2	4 7 7 7
3	0 1 3 5 7 9
4	0 3
5	1 2 6 6 8

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

- (a) How many workers are there in the company?
- (b) Find the mode of the ages of the workers.
- (c) If the company provides an extra travel allowance for the workers who are over 55 years old, how many workers can obtain the allowance?
39. The number of students who arrived late for school in the past 5 days are shown below:

8, 4, 0, 7, 11

Find the mean and the median of the above data.

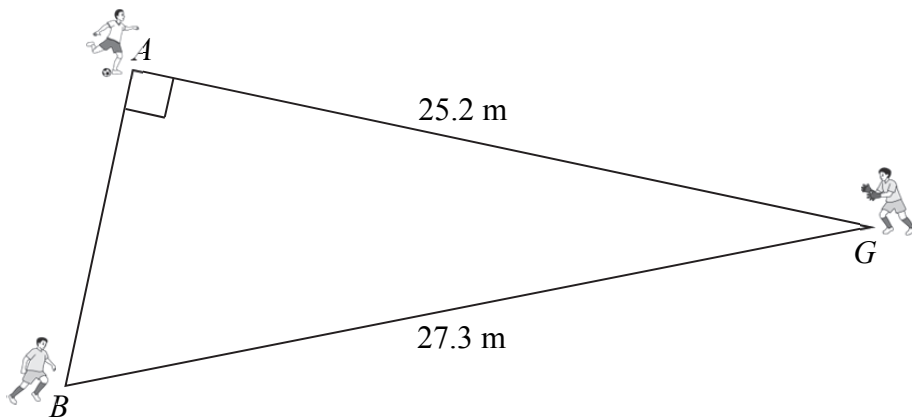


SECTION C: All working must be clearly shown.

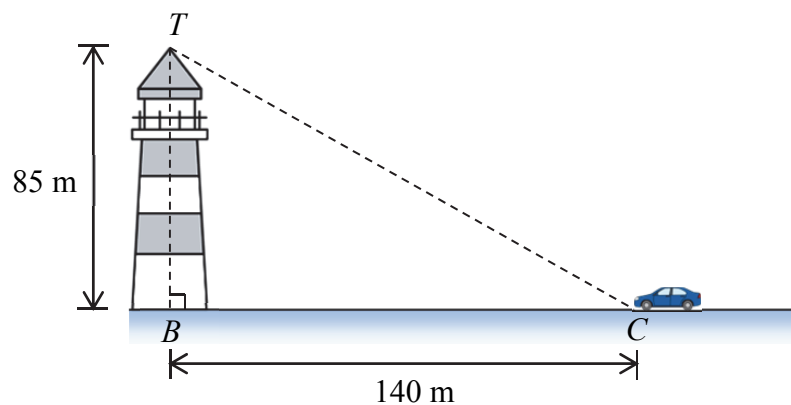
Write the mathematical expressions, answers and statements/conclusions in the spaces provided in the ANSWER BOOKLET.

40. Mabel deposits \$3 750 in a bank at a **simple interest rate** of 2% p.a. Find the interest she will receive after 3 years.

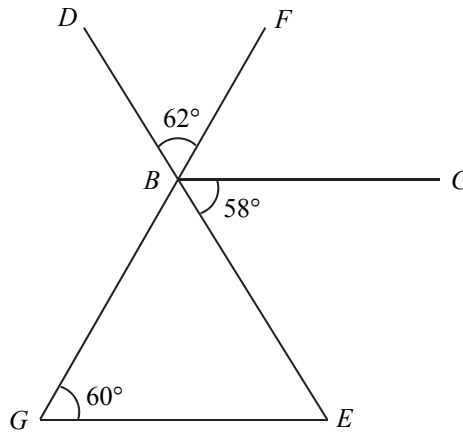
41. On a football field, Chris, Ronald and Fred are at the points  $A$ ,  $B$  and  $G$  respectively. If  $\angle GAB = 90^\circ$ ,  $AG = 25.2$  m and  $BG = 27.3$  m, find  $AB$ .



42. The figure shows a lighthouse  $TB$ . A car is located at point  $C$  which lies on the same horizontal plane with point  $B$ . It is given that  $TB \perp BC$ ,  $TB = 85$  m and  $BC = 140$  m. Find the angle of elevation of  $T$  from  $C$ . (Correct to 3 significant figures)



43. In the figure,  $DBE$  and  $FBG$  are straight lines.  $\angle DBF = 62^\circ$ ,  $\angle CBE = 58^\circ$  and  $\angle BGE = 60^\circ$ . Prove that  $BC \parallel GE$ .



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

$x$	-3	1	4
$y$		1	

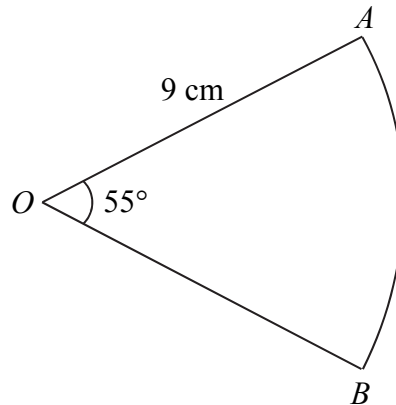
According to the table, draw the graph of this equation on the rectangular coordinate plane given in the **ANSWER BOOKLET**.

45. Student Union of a school wants to buy 598 souvenirs for Sports Day. The price of each souvenir is \$29.9. Student Union can only use \$20 000 to buy the souvenirs.

Based on the description above, give approximations for the **TWO UNDERLINED VALUES** respectively. Use these 2 approximations to estimate the total amount needed for buying the souvenirs and judge whether the Student Union has enough money to buy them.

Briefly explain your estimation method.

46. In the figure, the radius of sector  $OAB$  is 9 cm and  $\angle AOB = 55^\circ$ . Find the area of the sector. Give the answer correct to 3 significant figures.



47. A bag contains one \$2 coin, one \$5 coin and one \$10 coin. Michael draws 2 coins one by one at random from the bag. The second coin is drawn without putting the first coin back into the bag.
- (a) Some of the possible outcomes are given in the table provided in the **ANSWER BOOKLET**. Fill the remaining outcomes in the blanks.
- (b) Find the probability that the amount of the coins drawn by Michael is more than \$13.

END OF PAPER

