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Education Bureau
Territory-wide System Assessment 2014
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	$= 2\pi rh$
	Volume	$= \pi r^2 h$
Cone	Curved surface area	$= \pi rl$
	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) A fire broke out in a building, 16 firemen were sent to put out the fire.
 (ii) A wildfire broke out in the countryside, 16 square kilometres of land was burned.

	(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. Which of the following is correct?

- A. $9 < \sqrt{90}$
 B. $11 < \sqrt{110}$
 C. $13 < \sqrt{130}$
 D. $15 < \sqrt{150}$

3. $3 - x - x =$

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

4. The number of terms of the polynomial $2x^5 + x + 4$ is

- A. 2.
- B. 3.
- C. 4.
- D. 5.

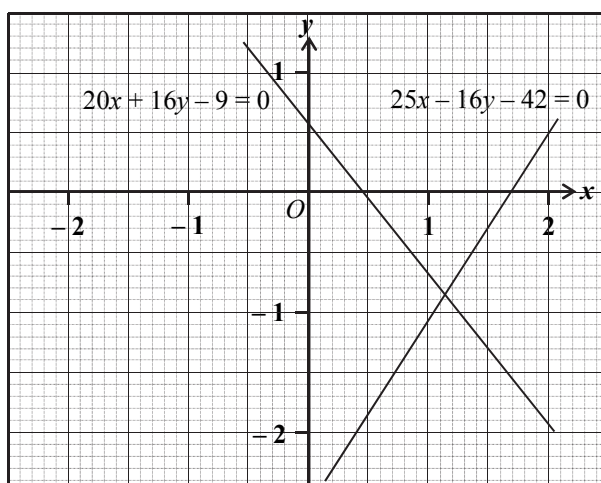
5. $6^{-2} =$

- A. -12 .
- B. $\frac{1}{12}$.
- C. -36 .
- D. $\frac{1}{36}$.

6. Which of the following is an equation with the root 2014?

- A. $2014 - x = 1$
- B. $2013 - x = 1$
- C. $\frac{x - 2012}{2} = 1$
- D. $\frac{x - 2011}{2} = 1$

7.



The above figure shows the graphs of $20x + 16y - 9 = 0$ and $25x - 16y - 42 = 0$.

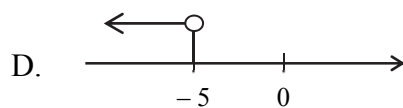
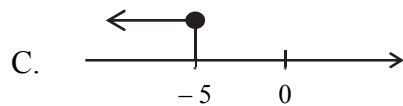
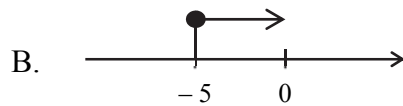
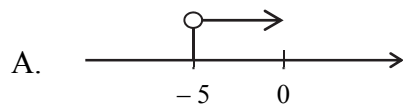
Solve the simultaneous equations $\begin{cases} 20x + 16y - 9 = 0 \\ 25x - 16y - 42 = 0 \end{cases}$ graphically.

- A. The approximate solution of the simultaneous equations is $(1.1, -0.9)$.
- B. The exact solution of the simultaneous equations is $(1.1, -0.9)$.
- C. The exact solution of the simultaneous equations is $(1.5, -1)$.
- D. There are no solutions.

8. Which of the following is an identity?

- A. $x + 16 = 0$
- B. $x + 16 = 16 + x$
- C. $x^2 + 16 = 2(x + 8)$
- D. $x^2 + 16 = (x + 4)^2$

9. Which of the following diagrams represents $x > -5$?



10. During Sports Day, Percy needs to measure the distance jumped by his classmates in the long jump event. Which of the following tools measures the distance with the smallest error?

A. Pencil



B. Ruler



C. Tape measure



D. Palm



11. The ratio of the corresponding heights of two similar solids is $2 : 3$. Which of the following is the ratio of their volumes?

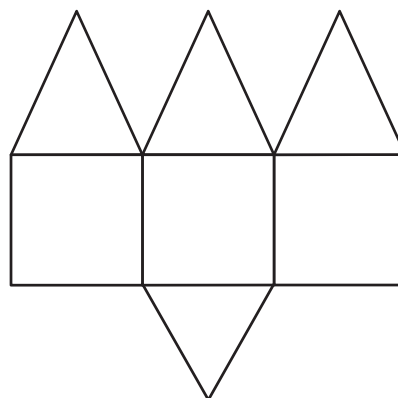
A. $2 : 3$

B. $2^2 : 3^2$

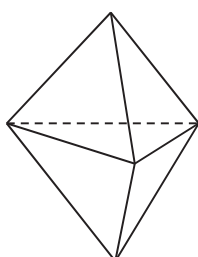
C. $2^3 : 3^3$

D. $2^4 : 3^4$

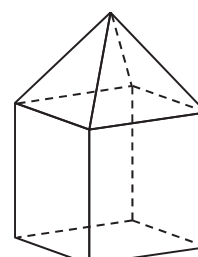
12. Which of the following 3-D figures can be made by the net on the right?



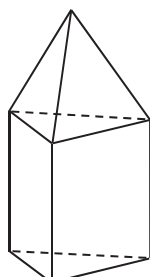
A.



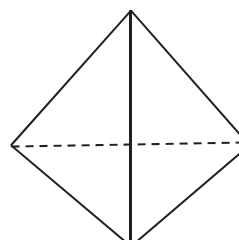
B.



C.

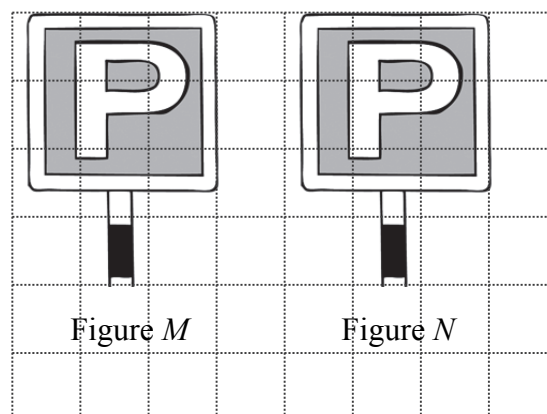


D.



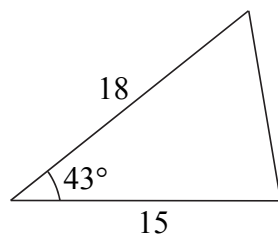
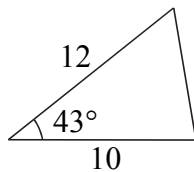
13. Figure *M* is changed to Figure *N* after a single transformation.
What is the corresponding transformation?

- A. Enlargement
B. Rotation
C. Translation
D. Reflection

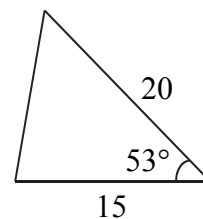
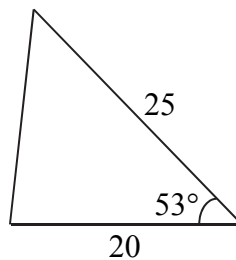


14. Which of the following pairs of triangles **CANNOT** be similar?

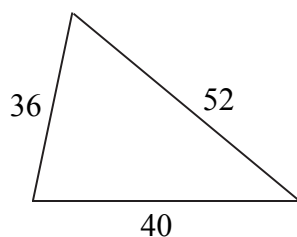
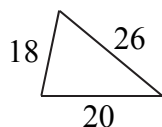
A.



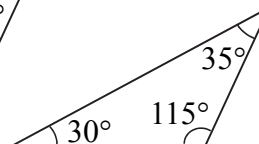
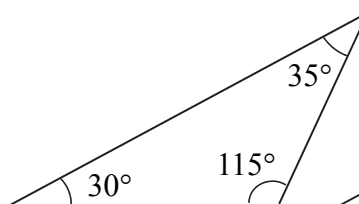
B.



C.



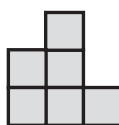
D.



15. The figures below show the 2-D representations of a solid from various views.



top view



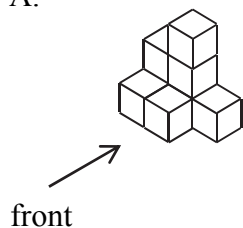
front view



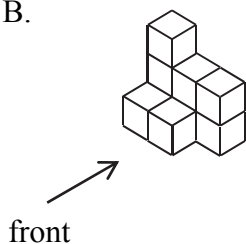
side view

Which of the following could be the solid?

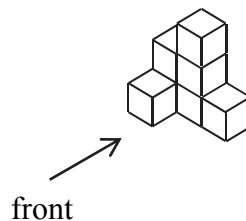
A.



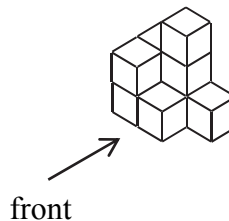
B.



C.

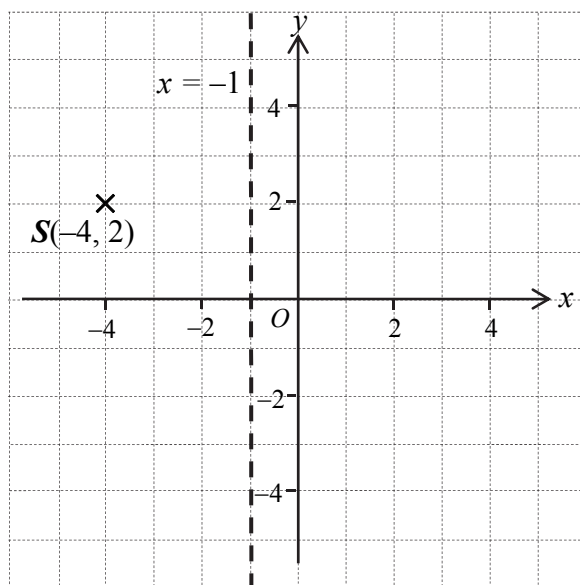


D.



16. $S(-4, 2)$ is reflected along the straight line $x = -1$ to S' . The coordinates of S' are

- A. $(-1, 2)$.
- B. $(2, 2)$.
- C. $(3, 2)$.
- D. $(4, 2)$.



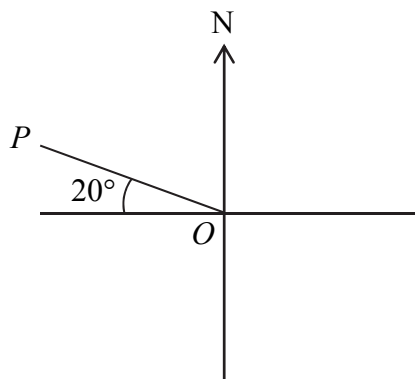
17. It is given that the slope of a straight line ℓ is $-\frac{3}{2}$. Which of the following straight lines is perpendicular to ℓ ?

Straight line	L_1	L_2	L_3	L_4
Slope	$-\frac{3}{2}$	$-\frac{2}{3}$	$\frac{3}{2}$	$\frac{2}{3}$

- A. L_1
- B. L_2
- C. L_3
- D. L_4

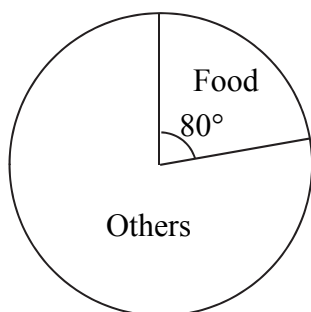
18. Refer to the figure, find the bearing of P from O .

- A. 020°
- B. 070°
- C. 110°
- D. 290°

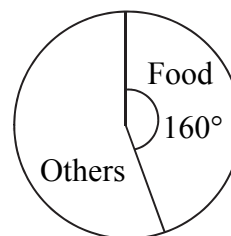


19. The following two pie charts show the expenditures of Johnson and Toby in May.

Expenditure of Johnson



Expenditure of Toby



Which of the following descriptions **MUST** be correct?

- A. The total expenditure of Johnson in May is more than that of Toby.
 - B. The expenditure of Johnson spent on food in May is more than that of Toby.
 - C. The expenditure of Toby spent on food in May is two times as much as that of Johnson.
 - D. The percentage of Toby's total expenditure spent on food in May is more than that of Johnson.
20. The following frequency distribution table shows the speeds detected from 100 vehicles passing through the entrance of a tunnel.

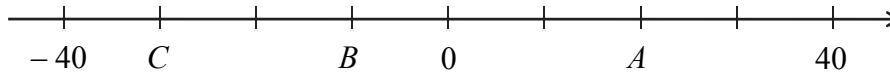
Speed (km/h)	45 – 49	50 – 54	55 – 59	60 – 64	65 – 69	70 – 74
Frequency	5	29	34	21	8	3

Which of the following is the most suitable to present the data in the above table?

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

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. Calculate $\frac{6(-3)}{-3+6}$.

23. The rainfall of a city in July is 500 mm. The rainfall in August is less than the rainfall in July by 100 mm. Find the ratio of the rainfall of the city in July and that in August.

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

$$64, 32, 16, 8, x, y, \dots$$

25. The n^{th} term of a sequence is $n(n+1)$. Find the value of the 10^{th} term of the sequence.

26. Simplify $(3h - 4k) + (2h + 7k)$.

27. Factorize $x^2 - 4x + 4$.

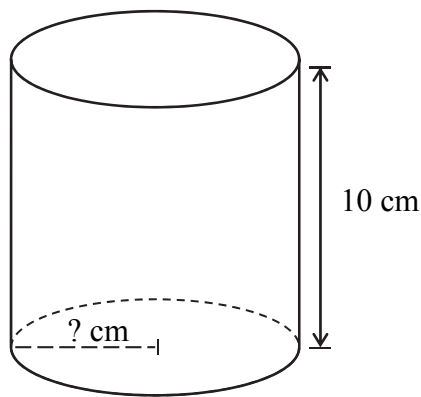
28. Factorize $x^2 - 4x - 5$.

29. Solve $3(x - 1) = -9$.

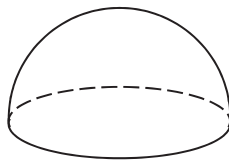
30. Expand $(2a + b)^2$.

31. Consider the formula $T = a + (n - 1)d$. If $a = 6$, $n = 13$ and $d = 2$, find the value of T .

32. The figure shows a right cylinder. Its height is 10 cm and its curved surface area is $120\pi \text{ cm}^2$. Find the base radius of the cylinder.



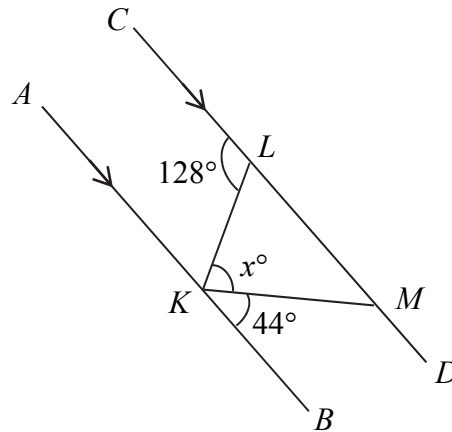
33. The figure shows the diagram of a hemisphere.



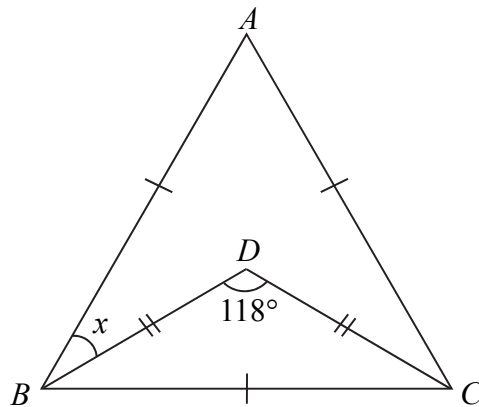
Referring to the sketching shown above, draw a diagram of a **cone** in the space provided in the **ANSWER BOOKLET**.

34. In the figure, AKB and $CLMD$ are straight lines, $AB \parallel CD$. $\angle CLK = 128^\circ$ and $\angle BKM = 44^\circ$.

Find the value of x .



35. In the figure, $\triangle ABC$ is an equilateral triangle, $DB = DC$ and $\angle BDC = 118^\circ$. Find x .



36. Figure I shows a cube $ABCDEFGH$. In Figure II, $BGED$ is a plane of reflectional symmetry of the cube. Apart from the plane $BGED$, name **ONE OF THE OTHER** planes of reflectional symmetry containing vertex B .

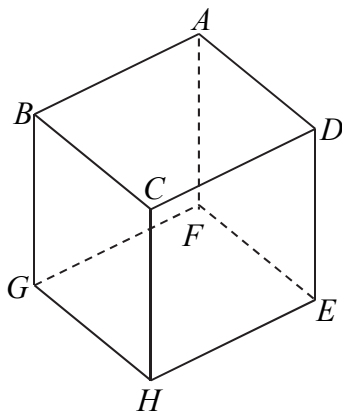


Figure I

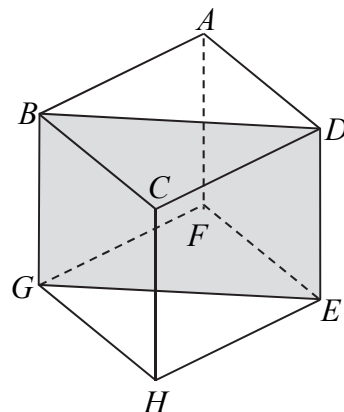
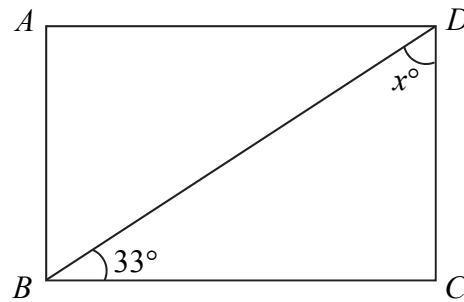
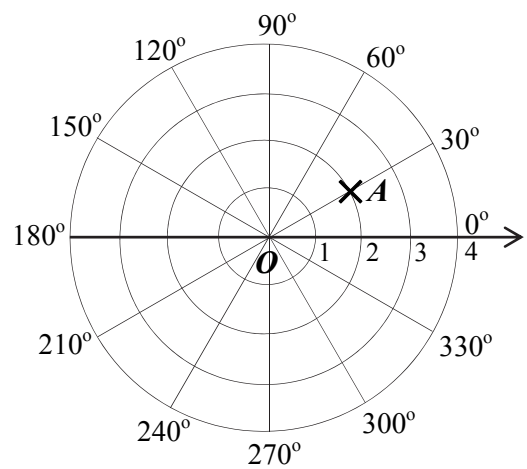


Figure II

37. In the figure, $ABCD$ is a rectangle. BD is one of the diagonals. Find the value of x .



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



39. Find the distance between two points $A(14, -2)$ and $B(9, 10)$ in a rectangular coordinate plane.

40. A librarian of Excellent Secondary School is doing a survey to analyse the reading habit of Secondary Three students in the school. The survey is conducted in the following four stages.

- (1) Analysing pie charts and data to draw conclusions.
- (2) Organising the data collected from the questionnaires.
- (3) Using pie charts to represent the data.
- (4) Giving questionnaires about the reading habit to the Secondary Three students.

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

41. Alfred joins his school's speech competition. The following table shows the weight of each marking item and his marks in these items.

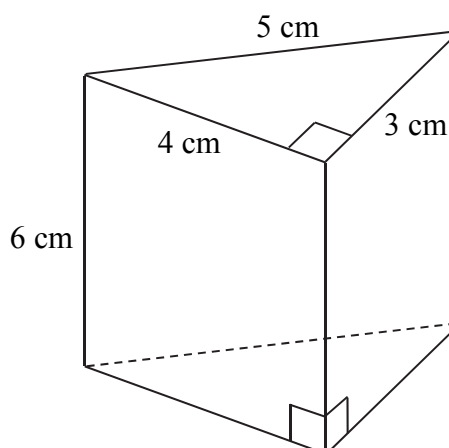
	Marking item			
	Content	Organization	Speaking Skills	Stage Performance
Mark	80	75	63	90
Weight	3	2	4	1

Find the weighted mean mark of Alfred.

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. An alloy is made of two metals, tin and copper, in the ratio 3 : 22 by weight. If the weight of the alloy is 50 kg, find the weight of copper in the alloy.
43. A guitar is sold for \$1 200 at a loss of \$300. Find the **cost price** and the **loss per cent** of the guitar.
44. In the figure, the base of the triangular prism is a right-angled triangle. Find the volume of the prism.



45. The following data show the number of volunteering hours of 20 students last year.

39	9	7	7	21
9	53	4	34	39
17	57	48	18	15
55	38	44	12	14

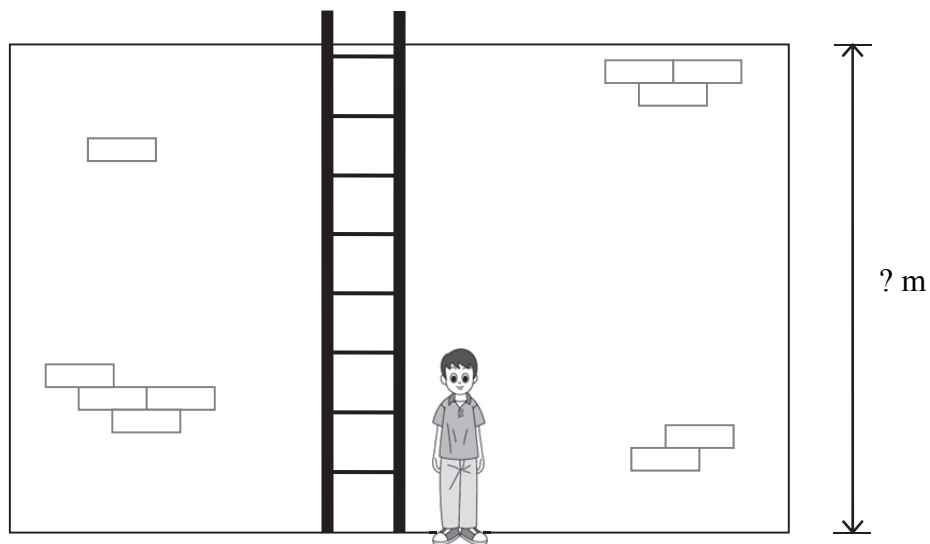
Use the data to complete the two frequency distribution tables in the ANSWER BOOKLET.

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

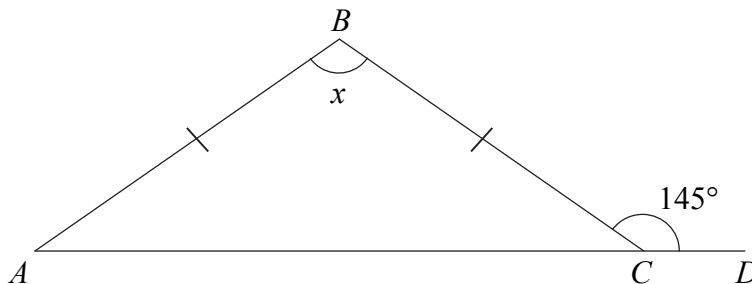
x		2	
y	3	0	-1

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

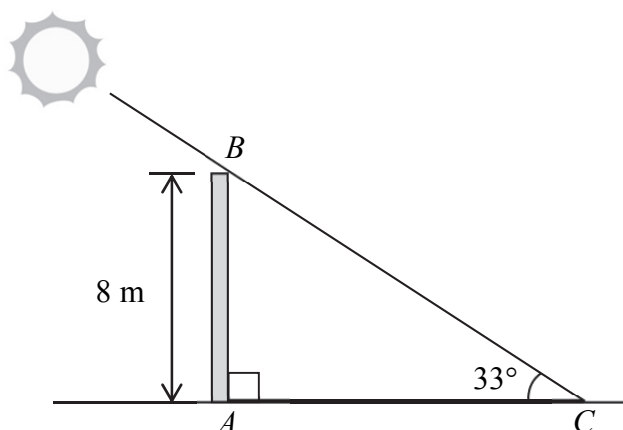
47. In the figure, Michael stands in front of a wall. There is a ladder besides him. If Michael is 1.5 m tall, estimate the height of the wall and explain your estimation method.



48. In the figure, ACD is a straight line. $BA = BC$ and $\angle BCD = 145^\circ$. Find x .



49. In the figure, a vertical pole is 8 m tall. The angle between the ray BC and the ground is 33° . Find the length of the shadow AC of the pole. Correct the answer to 1 decimal place.



50. The table below shows the heights of 50 Secondary One students.

Height (cm)	140 – 144	145 – 149	150 – 154	155 – 159
Frequency	14	24	8	4

Find the mean height of the 50 Secondary One students.

END OF PAPER

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Answers written on this page will not be marked.

