

<b>9</b>	<b>M</b>	<b>E</b>	<b>4</b>	<b>(</b>	<b>Q</b>	<b>)</b>
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**Education Bureau**  
**Territory-wide System Assessment 2016**  
**Secondary 3 Mathematics**  
**QUESTION BOOKLET**

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**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. Determine whether to estimate or to compute the exact value in each of the following situations.

- (i) A shop manager records the number of mobile phones sold yesterday.
- (ii) A student wants to know the total number of mobile phones owned by Hong Kong people.

	(i)	(ii)
A.	To compute the exact value	To compute the exact value
B.	To compute the exact value	To estimate
C.	To estimate	To compute the exact value
D.	To estimate	To estimate

2.  $4.06 \times 10^{-3} =$

- A. 0.000 406.
- B. 0.004 06.
- C. 4 060.
- D. 406 000.

3. There are  $x$  students in class 3A. Half of them wear glasses. Among the students wearing glasses, 12 of them are boys. Find the number of girls wearing glasses in the class.

- A.  $\frac{x+12}{2}$
- B.  $\frac{x-12}{2}$
- C.  $\frac{x}{2}+12$
- D.  $\frac{x}{2}-12$

4. Which of the following is a polynomial?

A.  $\frac{1}{2x^2} + 5$

B.  $2x^2 + 5$

C.  $2^x + 5$

D.  $2\sqrt{x} + 5$

5.  $(-5)^2 =$

A. 25.

B. -25.

C. 10.

D. -10.

6. Which of the following is an equation with the root 50?

A.  $x - 100 = 0$

B.  $x + 100 = 0$

C.  $x - 50 = 0$

D.  $x + 50 = 0$

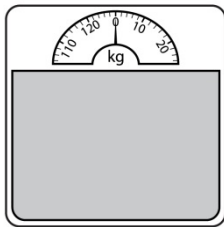
7. Which of the following points lies on the straight line  $y = 2x + 6$ ?

- A. (0, 6)
- B. (6, 0)
- C. (0, -3)
- D. (3, 0)

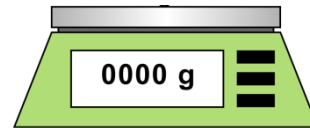
8. Which of the following is an identity?

- A.  $4x + 10 = 0$
- B.  $4x + 10 = 14x$
- C.  $4x + 10 = (2x + 5)^2$
- D.  $4x + 10 = \frac{8x + 20}{2}$

9.



Bathroom scale



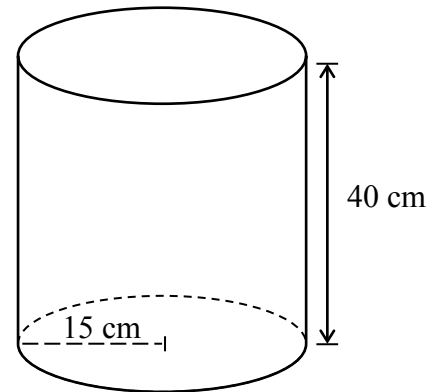
Electronic balance

The above figure shows a bathroom scale and an electronic balance. In an experiment, Cindy wants to find the weight of a twenty-dollar note. Which of the following methods is the best?

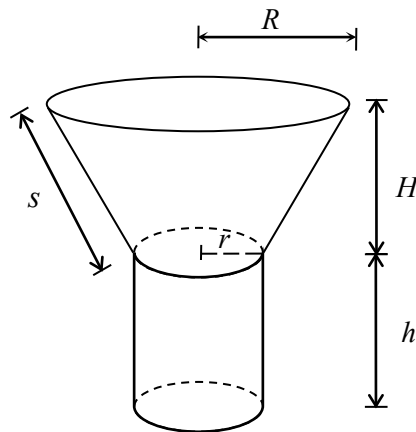
- A. Cindy uses a bathroom scale to measure the weight of a twenty-dollar note.
- B. Cindy uses an electronic balance to measure the weight of a twenty-dollar note.
- C. Cindy uses a bathroom scale to measure the weight of 50 twenty-dollar notes and then divides the weight by 50.
- D. Cindy uses an electronic balance to measure the weight of 50 twenty-dollar notes and then divides the weight by 50.

10. The figure shows a solid cylinder. Its base radius is 15 cm and its height is 40 cm. Find the total surface area of the cylinder. Express the answer in terms of  $\pi$ .

- A.  $1200\pi \text{ cm}^2$   
 B.  $1425\pi \text{ cm}^2$   
 C.  $1650\pi \text{ cm}^2$   
 D.  $9000\pi \text{ cm}^2$



- 11.



The solid in the figure is formed by a frustum and a cylinder. The bases of the frustum are both circles. The unknowns are defined as follows:

Frustum	
$R$	Radius of the larger base
$r$	Radius of the smaller base
$H$	Height
$s$	Lateral height

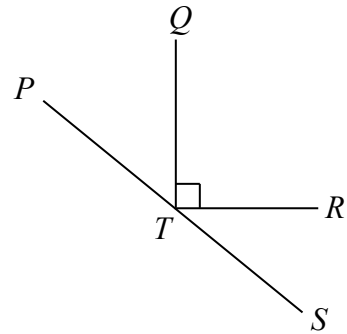
Cylinder	
$r$	Base radius
$h$	Height

By considering the **dimensions**, determine which of the following could express the volume of the solid.

- A.  $\frac{\pi}{3} [H(R^2 + rR + r^2) + 3r^2h]$   
 B.  $\frac{\pi}{3} [(r + R)s + 2rh + r^2 + R^2]$   
 C.  $\pi(r + R + 2h + 2H + s)$   
 D.  $\pi(r + R)s$

12. In the figure,  $PTS$  is a straight line. Which of the following is a straight angle?

- A.  $\angle PTQ$
- B.  $\angle QTR$
- C.  $\angle QTS$
- D.  $\angle PTS$



13. Figure  $P$  is changed to Figure  $Q$  after a single transformation. What is the corresponding transformation?



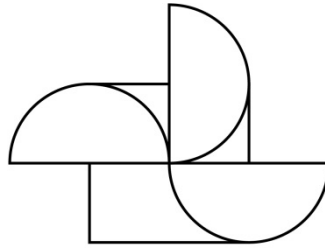
Figure  $P$



Figure  $Q$

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

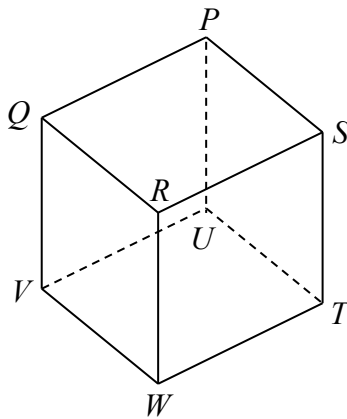
14.



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

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

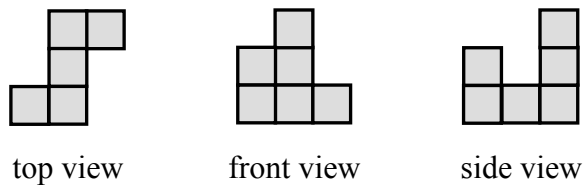
15. The figure shows a cube  $PQRSTUWV$ . Which of the following is a plane of reflectional symmetry of the cube?



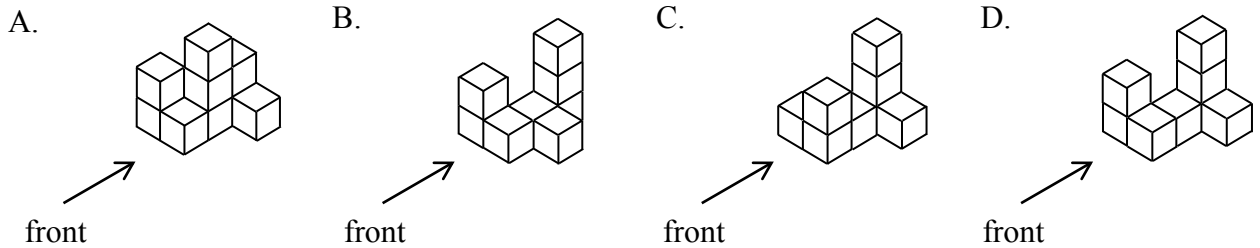
- A.  $PQWT$
- B.  $PQVU$
- C.  $PQRS$
- D.  $RQVW$



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

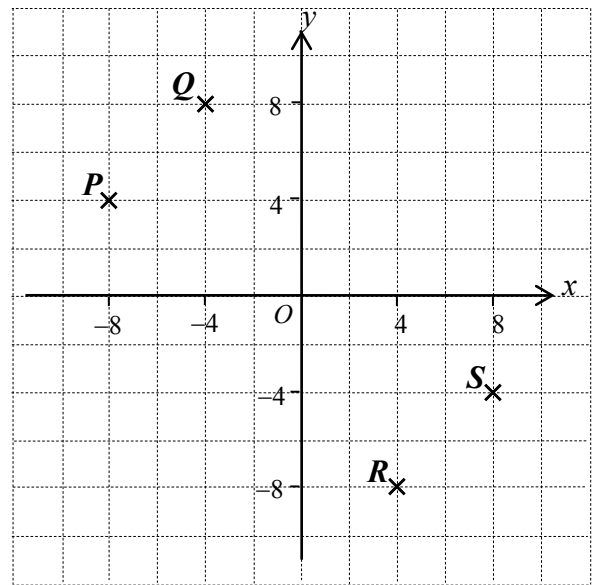


Which of the following could be the solid?



17. In the figure, which point can be represented by  $(4, -8)$ ?

- A. ***P***
- B. ***Q***
- C. ***R***
- D. ***S***

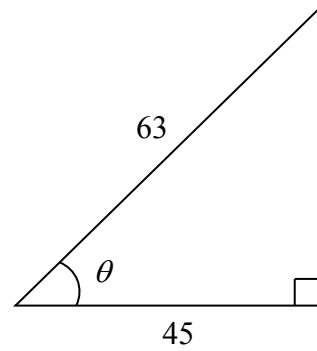


18.  $A(1, 2)$  and  $B(3, 4)$  are two points in a rectangular coordinate plane. The coordinates of the mid-point of  $AB$  are

- A.  $(1, 1)$ .
- B.  $(2, 2)$ .
- C.  $(2, 3)$ .
- D.  $(4, 6)$ .

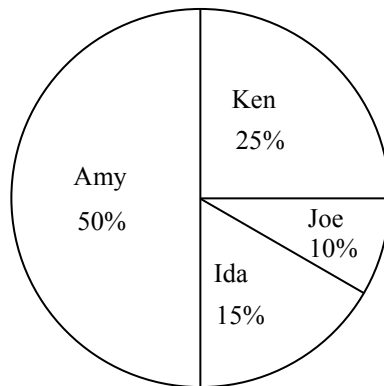
19. Referring to the figure, find  $\theta$ . (Correct to the nearest degree)

- A.  $54^\circ$
- B.  $46^\circ$
- C.  $44^\circ$
- D.  $36^\circ$



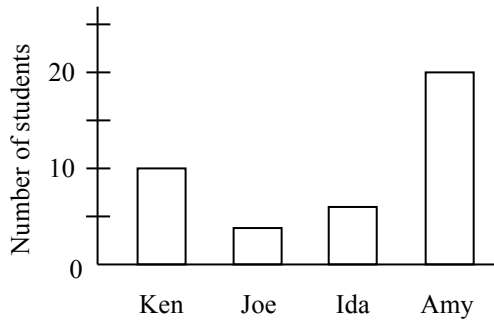
20. The 40 students in class 3A held the election for class monitor. The result is as follows:

**Result of the election for 3A class monitor**

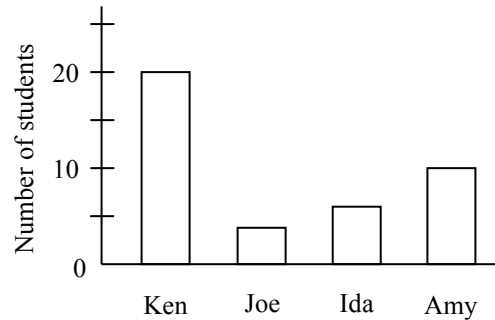


If the above data are presented by a bar chart, which of the following could be obtained?

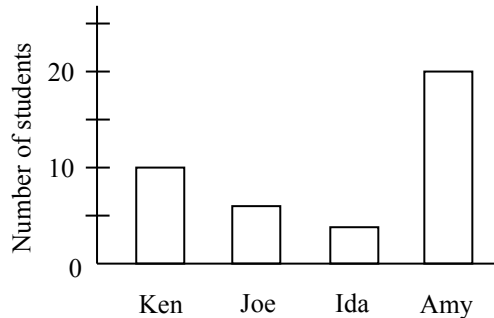
A. **Result of the election for 3A class monitor**



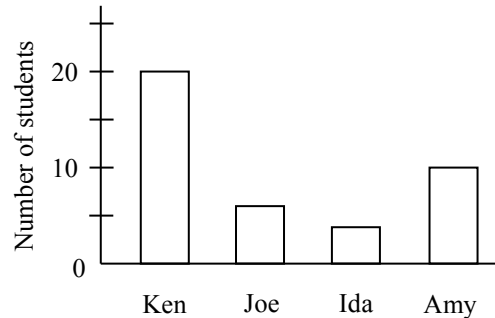
B. **Result of the election for 3A class monitor**



C. **Result of the election for 3A class monitor**



D. **Result of the election for 3A class monitor**



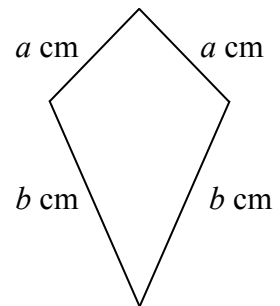
SECTION B: Write ALL the answers in the ANSWER BOOKLET.  
Working need not be shown.

21. Calculate  $\frac{8+(-2)}{-2}$ .

22. The weight of a plane is about 185 000 kg. Use scientific notation to represent this number.

23. In a bag of 12 marbles, 5 are red, and the rest are green. Find the ratio of the number of red marbles to the number of green marbles.

24. In the figure, the perimeter of the kite is  $P$  cm, where  $P = 2a + 2b$ .  
If  $P = 20$  and  $b = 8$ , find the value of  $a$ .

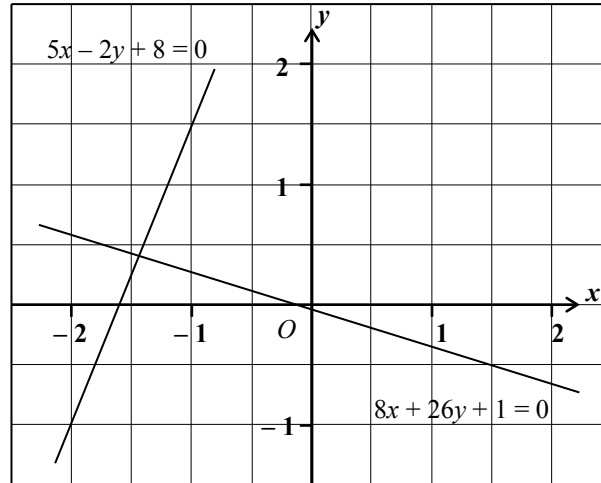


25. Write down the constant term of the polynomial  $5y^2 - 4y + 11$ .

26. Expand  $(y+1)(y+3)$ .

27. Factorize  $x^2 - 16$ .

28.



The above figure shows the graphs of  $5x - 2y + 8 = 0$  and  $8x + 26y + 1 = 0$ .

According to the given graphs,  $(-1.5, 0.5)$  is the \* exact solution / approximate solution of the simultaneous equations  $\begin{cases} 5x - 2y + 8 = 0 \\ 8x + 26y + 1 = 0 \end{cases}$ .

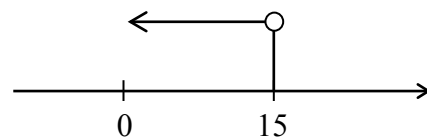
(\*Circle the correct answer in the **ANSWER BOOKLET**)

29. Make  $H$  the subject of the formula  $G = \frac{H + 3}{2}$ .

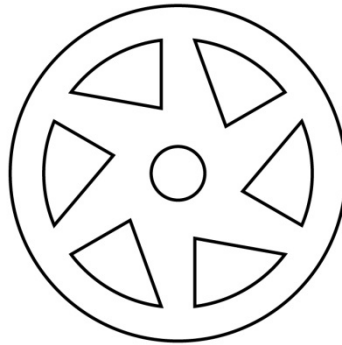
30. In the **ANSWER BOOKLET**, fill in the box with  $>$  or  $<$  to express the relation between the numbers.

-3.1            -3.2

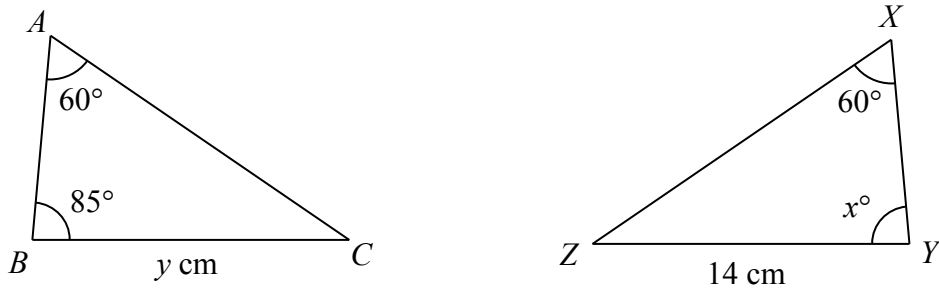
31. According to the diagram, write down an inequality in  $x$ .



32. Find the order of rotational symmetry of the following figure.



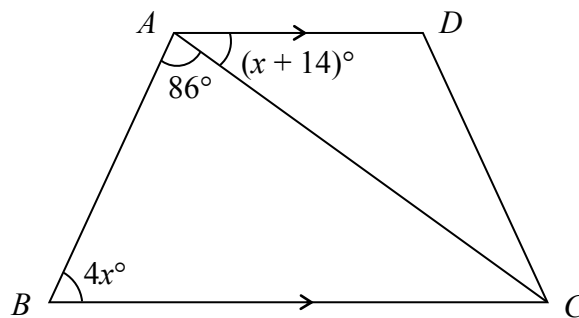
33.



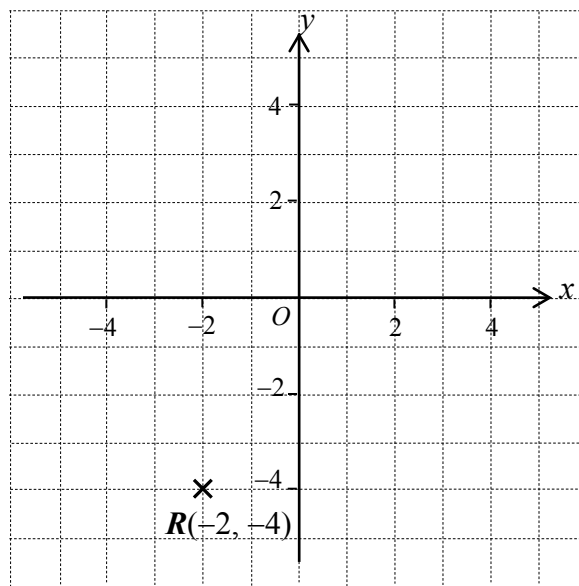
In the figure,  $\triangle ABC \cong \triangle XYZ$ . Find

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

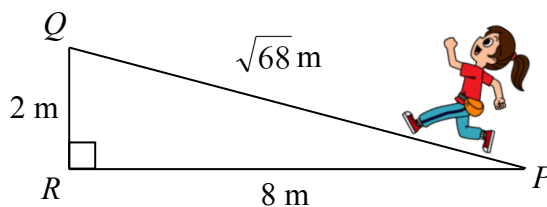
34. In the figure,  $ABCD$  is a trapezium where  $AD \parallel BC$ . Find the value of  $x$ .



35.  $R(-2, -4)$  is reflected along the  $x$ -axis to  $R'$ . Find the coordinates of  $R'$ .



36. Betty walks upwards along a path  $PQ$  of length  $\sqrt{68}$  m. If the vertical distance  $QR$  is 2 m and the horizontal distance  $PR$  is 8 m, find the gradient of the path  $PQ$ .

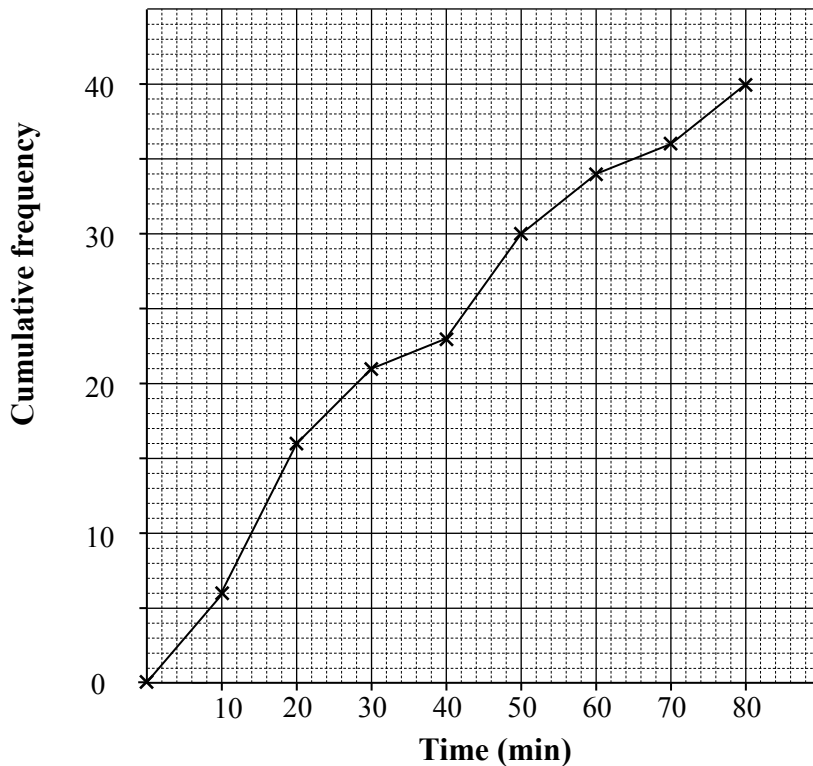


37. Determine whether each of the following data is discrete or continuous.

- (i) The studying time of John every day
- (ii) The number of Secondary Three students

38. The cumulative frequency polygon below shows the time spent on physical activities by 40 students on a day.

**The time spent on physical activities by 40 students on a day**



Find the upper quartile of the time spent on physical activities by the students on a day.

39. Mary joins a drawing competition. The following table shows the weight of each marking item and her marks in these items.

	Marking item		
	Drawing skills	Main idea	Use of materials
Mark	78	80	90
Weight	50%	30%	20%

Find the weighted mean mark of Mary.

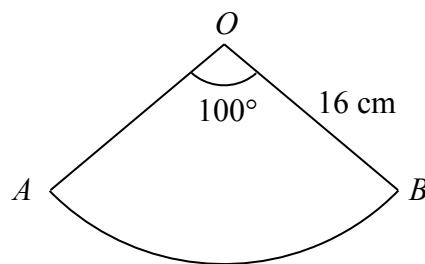
SECTION C: All working must be clearly shown.

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

40. The cost of a washing machine is \$5 820. It is sold at a loss of 15%. Find the selling price of the washing machine.

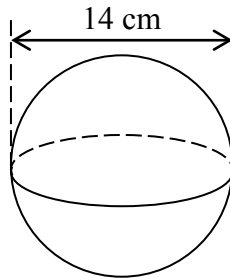
41. Peter deposits \$15 625 in a bank. The interest rate is 4% p.a. compounded yearly. Find the amount he will receive after 3 years.

42. In the figure, the radius of sector  $OAB$  is 16 cm and  $\angle AOB = 100^\circ$ . Find the length of  $\widehat{AB}$ . Give the answer correct to 3 significant figures.





43. The figure shows a sphere of diameter 14 cm. Find the surface area of the sphere. Give the answer correct to the nearest  $0.1 \text{ cm}^2$ .



44. Complete the table for the equation  $y = -\frac{x}{3} + 1$  in the **ANSWER BOOKLET**.

$x$	-3	0	3
$y$	2		

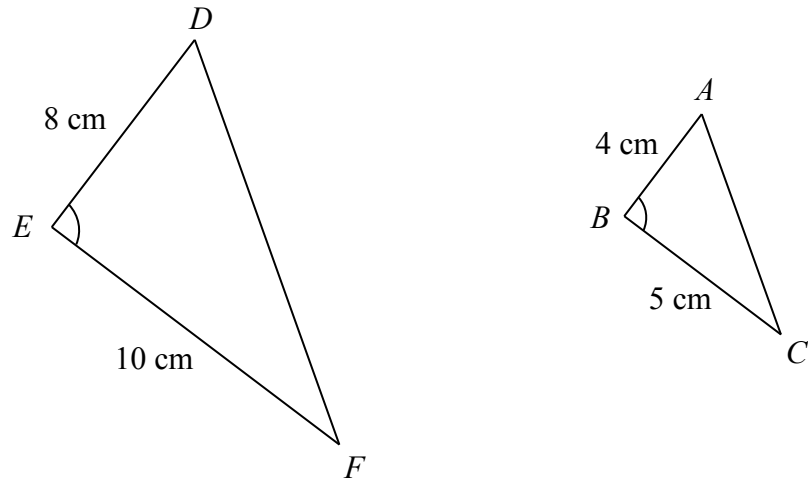
According to the table, draw the graph of this equation on the rectangular coordinate plane given in the **ANSWER BOOKLET**.

45. The table below shows the transportation expenses of 50 students last Friday.

Transportation expenses (\$)	0 – 14	15 – 29	30 – 44	45 – 59
Frequency	5	18	20	7

- (a) According to the above table, complete the frequency distribution table in the **ANSWER BOOKLET**.
- (b) Find the mean of the transportation expenses of the 50 students last Friday.

46. In the figure,  $\angle DEF = \angle ABC$ ,  $DE = 8$  cm,  $EF = 10$  cm,  $AB = 4$  cm and  $BC = 5$  cm. Prove that  $\triangle DEF \sim \triangle ABC$ .



47. The following frequency distribution table shows the high jump records of 80 students.

Height (cm)	106 – 110	111 – 115	116 – 120	121 – 125	126 – 130
Class Mark (cm)	108	113	118	123	128
Number of students	12	18	30	11	9

According to the above data, complete the frequency polygon in the **ANSWER BOOKLET**.

END OF PAPER

**Do not write on this page.**

**Answers written on this page will not be marked.**

