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Education Bureau
Territory-wide System Assessment 2015
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. There are two kinds of coins, \$2 and \$10, in a box. The total value of the coins is \$64. Which of the following numbers **CANNOT** be the total number of coins in the box?
 - A. 50
 - B. 28
 - C. 16
 - D. 12

2. Round off 0.079 95 to 3 decimal places.
 - A. 0.079 9
 - B. 0.08
 - C. 0.080
 - D. 0.080 0

3. $1.23 \times 10^4 =$
 - A. 12 300.
 - B. 1 230 000.
 - C. 0.000 123.
 - D. 0.000 012 3.

4. Which of the following is a polynomial?
 - A. $2x^2 + 3\sqrt{x}$
 - B. $\frac{x^2}{2} + 3x$
 - C. $2^x + 3x$
 - D. $2x^2 + \frac{1}{3x}$

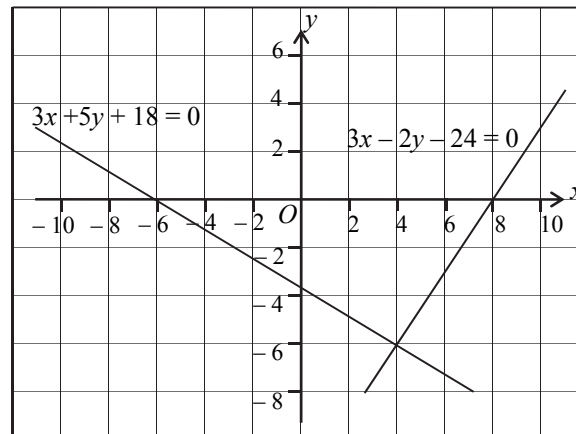
5. $(2a)^3b^3 =$

- A. $2(ab)^3$.
- B. $2(ab)^6$.
- C. $(2ab)^3$.
- D. $(2ab)^6$.

6. Which of the following statements is correct?

- A. The root of $3x - 1 = -2$ is -1 .
- B. The root of $5x - 2 = -8$ is -2 .
- C. The root of $7x + 3 = -18$ is -3 .
- D. The root of $9x + 4 = -40$ is -4 .

7.



The above figure shows the graphs of $3x + 5y + 18 = 0$ and $3x - 2y - 24 = 0$.

Solve the simultaneous equations $\begin{cases} 3x + 5y + 18 = 0 \\ 3x - 2y - 24 = 0 \end{cases}$ graphically.

- A. $(8, 0)$
- B. $(-6, 0)$
- C. $(-6, 4)$
- D. $(4, -6)$

8. Which of the following is an identity?

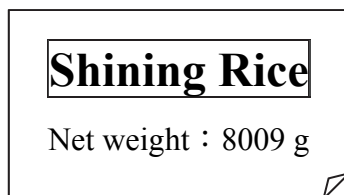
- A. $4x + 8y = 12xy$
- B. $4(x + 2y) = 4x + 2y$
- C. $4(x - 2) = 4(2 - x)$
- D. $4x - 8 = 4(x - 2)$

9. Mary is x years old now. Andy is 3 times as old as Mary. If the sum of their ages is **not less than** 40, which of the following inequalities can be used to find the range of values of x ?

- A. $x + \frac{x}{3} \leq 40$
- B. $x + \frac{x}{3} \geq 40$
- C. $x + 3x \leq 40$
- D. $x + 3x \geq 40$

10. Danny buys a bag of rice in a supermarket. Which of the following labels shows the net weight of the bag of rice with the most suitable unit and degree of accuracy?

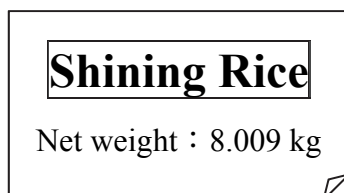
A.



B.



C.

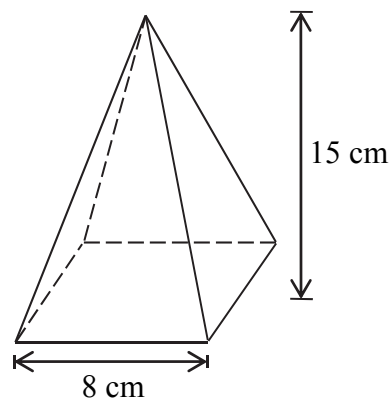


D.



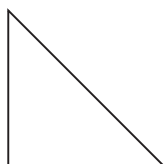
11. The height of the pyramid in the figure is 15 cm. Its base is a square of side 8 cm. Find the volume of the pyramid.

- A. 304 cm^3
- B. 312 cm^3
- C. 320 cm^3
- D. 960 cm^3



12. Which of the following is a regular polygon?

A.



Right-angled triangle

B.



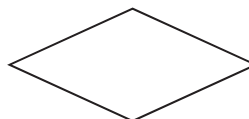
Square

C.



Star

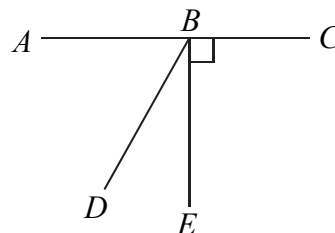
D.



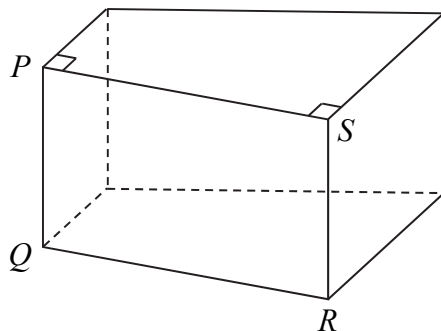
Rhombus

13. In the figure, ABC is a straight line. Which of the following is an acute angle?

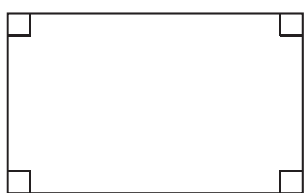
- A. $\angle ABC$
- B. $\angle ABD$
- C. $\angle CBD$
- D. $\angle CBE$



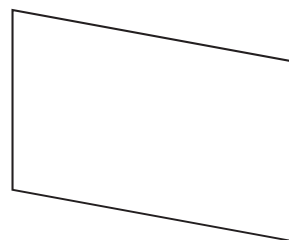
14. The figure shows a right prism. Its base is a trapezium. Alex sketches a cross-section which is parallel to the plane $PQRS$. Which of the following sketches could express the plane diagram of the cross-section?



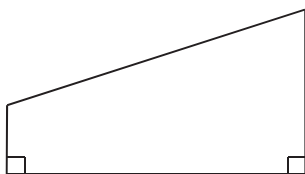
A.



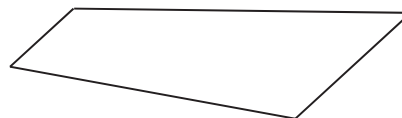
B.



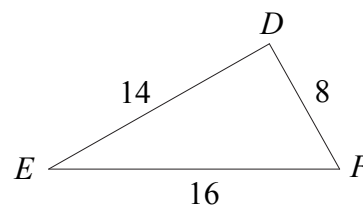
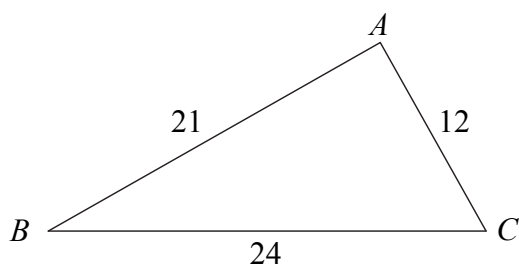
C.



D.



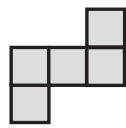
15.



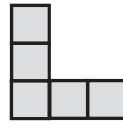
According to the figures above, which of the following is correct?

- A. $\triangle ABC \cong \triangle DEF$ (SSS)
- B. $\triangle ABC \sim \triangle DEF$ (SSS)
- C. $\triangle ABC \cong \triangle DEF$ (3 sides proportional)
- D. $\triangle ABC \sim \triangle DEF$ (3 sides proportional)

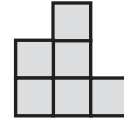
16. The figures below show the 2-D representations of a solid from various views.



top view

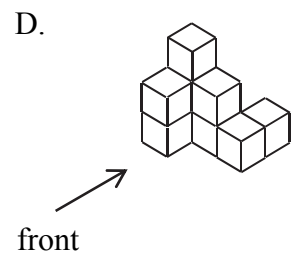
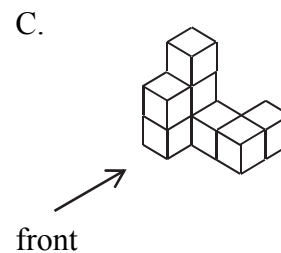
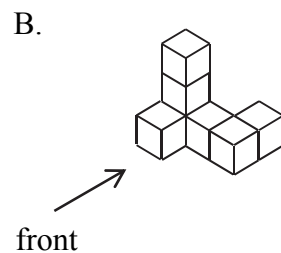
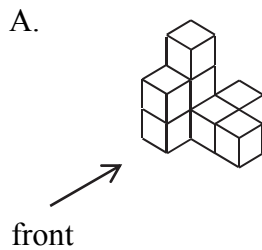


front view



side view

Which of the following could be the solid?

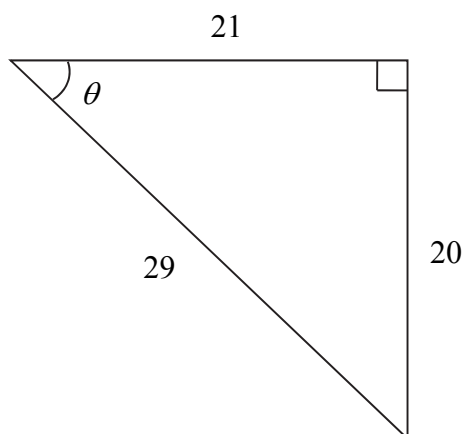


17. If $A(4, 3)$ and $B(6, -8)$ are two points in a rectangular coordinate plane, the distance between A and B is

- A. $\sqrt{(4-6) + [3 - (-8)]}$ units.
- B. $\sqrt{(4-6)^2 + [3 - (-8)]^2}$ units.
- C. $\sqrt{(4+6) + [3 + (-8)]}$ units.
- D. $\sqrt{(4+6)^2 + [3 + (-8)]^2}$ units.

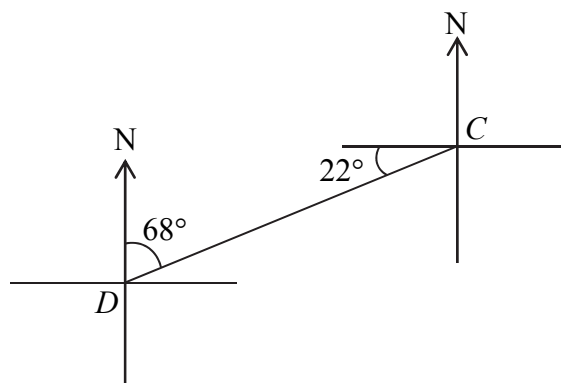
18. Refer to the figure, find the value of $\sin \theta$.

- A. $\frac{20}{29}$
- B. $\frac{20}{21}$
- C. $\frac{21}{29}$
- D. $\frac{29}{20}$

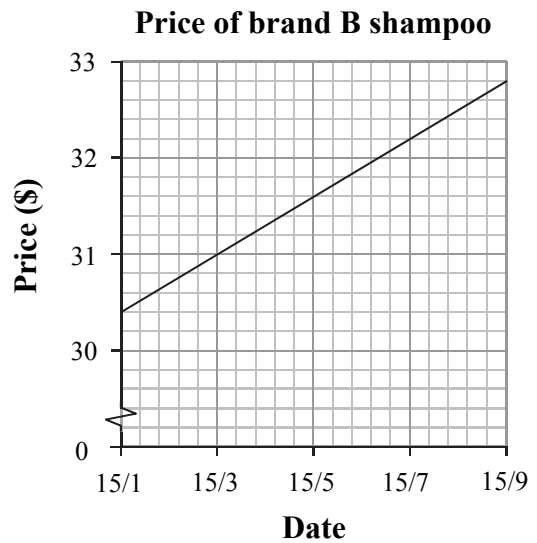
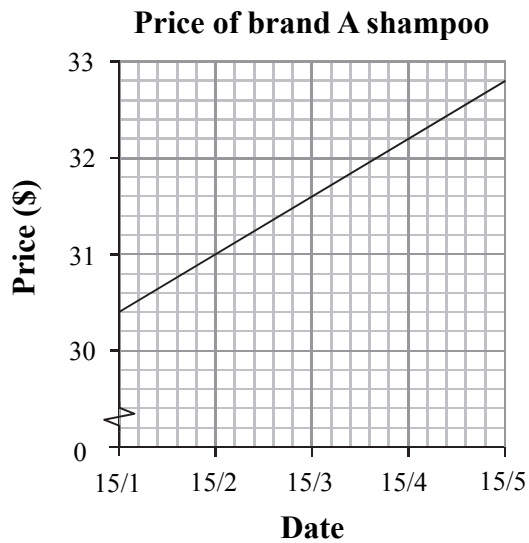


19. Refer to the figure, find the bearing of D from C .

- A. $S68^\circ W$
- B. $N68^\circ E$
- C. $S22^\circ W$
- D. $N22^\circ E$



20. The diagrams below show the prices of two different brands of shampoos in 2014.



Based on the diagrams above, Johnson believes that the prices of the two brands of shampoos are increasing at the same rate.

Which of the following statements is the best reason that Johnson is misled by the above diagrams?

- A. The number of customers buying brand A shampoo and that of brand B shampoo are not shown.
- B. The scales of the 2 horizontal axes are not the same.
- C. The scales of the 2 vertical axes are not the same.
- D. There is no comparison of the prices of other brands of shampoos.

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

21. +5 persons represents 5 persons boarding a train, while -5 persons represents 5 persons leaving a train.

Use a directed number to represent each of the following situations:

- (i) On Platform No.1, there are 68 persons boarding a train.
- (ii) On Platform No.2, there are 95 persons leaving a train.

22. When $x^3 - 6x^2 + 11x - 6$ is factorized, the result is $(x - 1)(x - 2)(x - 3)$.
What is the result when $(x - 1)(x - 2)(x - 3)$ is expanded?

23. A printer can print 120 pages in 5 minutes. Find the print speed of the printer. Express the answer in pages / min.

24. The n^{th} term of a sequence is $3n + 5$. Find the value of the 4th term of the sequence.

25. Expand $x(4x + xy - y)$.

26. Factorize $x^2 + 6x + 9$.

27. Draw the graph of the equation $x + y - 2 = 0$ on the rectangular coordinate plane given in the **ANSWER BOOKLET**. The range of x must include the values from -2 to 2.

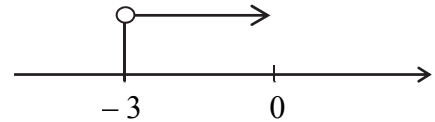
28. Make P the subject of the formula $N = \frac{P}{4} + 1$.

29. Simplify $\frac{x}{y} - \frac{x}{3y}$.

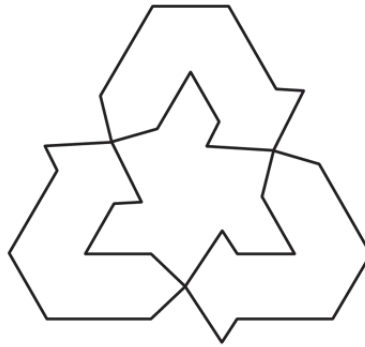
30. In the **ANSWER BOOKLET**, fill in the box with $>$ or $<$ to express the relation between the numbers.

$$-\frac{5}{3} \quad \boxed{} \quad -\frac{5}{4}$$

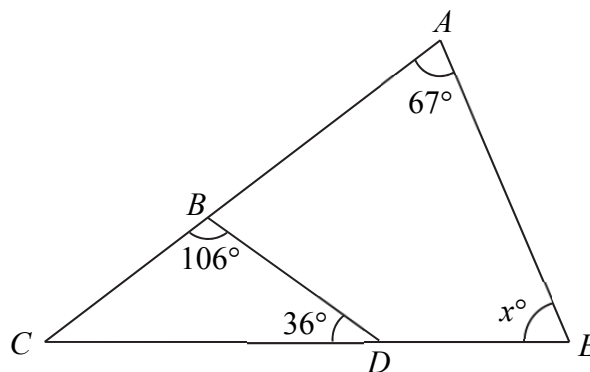
31. According to the diagram, write down an inequality in x .



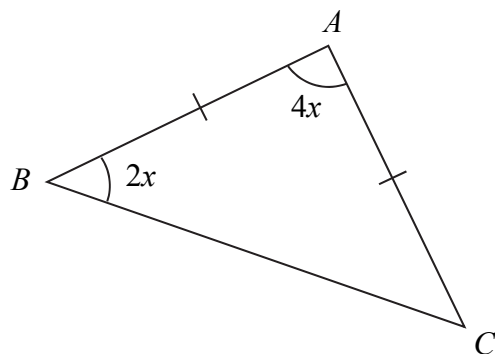
32. The figure below has rotational symmetry. Find its order of rotational symmetry.



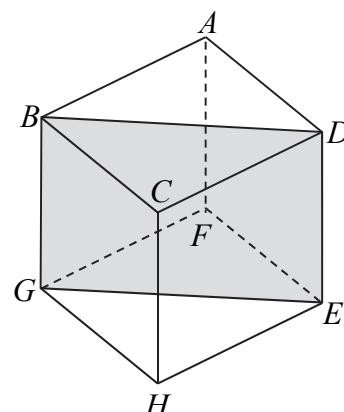
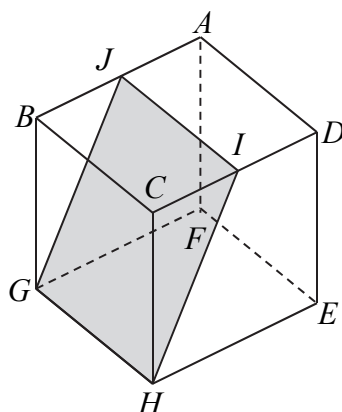
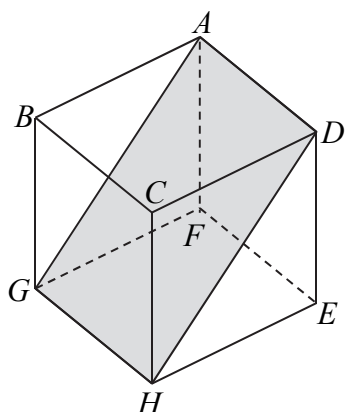
33. In the figure, ABC and CDE are straight lines. $\angle CAE = 67^\circ$, $\angle CBD = 106^\circ$ and $\angle BDC = 36^\circ$. Find the value of x .



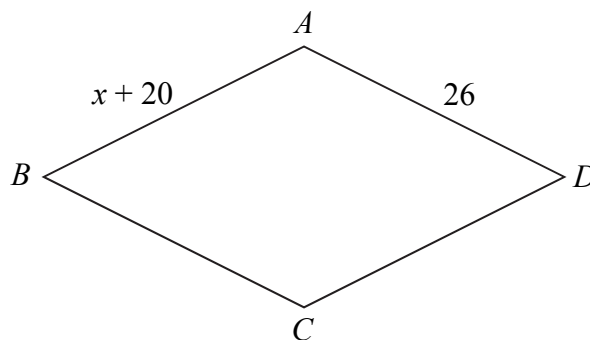
34. In the figure, $\triangle ABC$ is an isosceles triangle. $AB = AC$, $\angle ABC = 2x$ and $\angle BAC = 4x$. Find x .



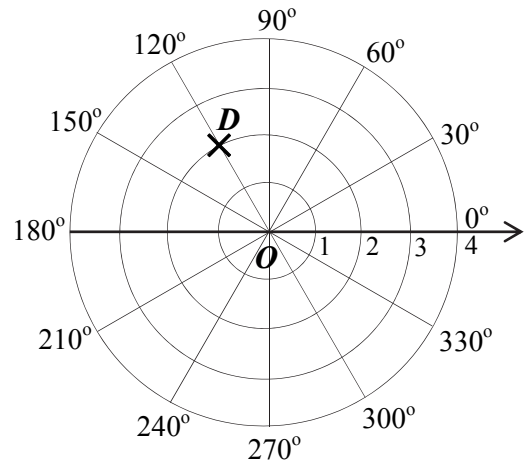
35. The following shaded regions are the three planes inside the cube $ABCDEFGH$, namely, $AGHD$, $GHIJ$ and $BGED$. One of them is **NOT** a plane of reflectional symmetry of the cube, name this plane.



36. In the figure, $ABCD$ is a rhombus. Find the value of x .



37. Find the polar coordinates of point **D** in the figure.



38. $A(9, -1)$ and $B(4, -3)$ are two points on a straight line L in a rectangular coordinate plane. Find the slope of L .

39. Miss Chow is doing a survey to analyse information about the careers of last year's graduates. The survey is conducted in the following four stages.

- (1) Giving career questionnaires to last year's graduates.
- (2) Analysing bar charts and data to draw conclusions.
- (3) Using bar charts to represent the data.
- (4) Collecting questionnaires and organising the data obtained.

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

40. The marks of Kitty in 5 Chinese Language tests are as follows:

70, 80, 90, 80, 70

Find the median and mean of the above data.

41. The table below shows the travelling distances of 50 taxis last Friday.

Travelling distances (km)	321 – 340	341 – 360	361 – 380	381 – 400	401 – 420
Frequency	4	7	11	22	6

From the above information, find the modal class of the travelling distances.

SECTION C: All working must be clearly shown.

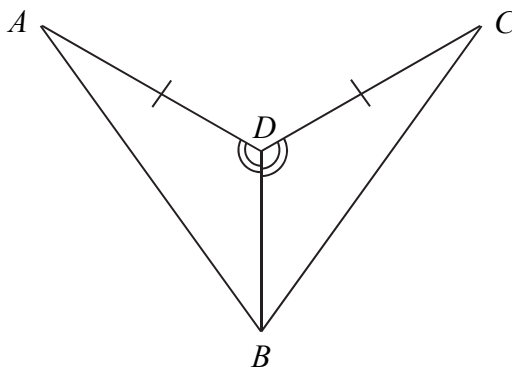
Write the mathematical expressions, answers and statements/conclusions in the spaces provided in the ANSWER BOOKLET.

42. Vivian borrows a sum of money from a bank. The interest rate is 5% p.a. If she has to pay \$789 as simple interest after 3 years, find the amount of money she borrows from the bank.

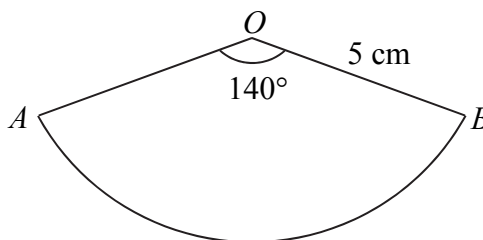
43. In a quality test of x rice cookers, 12 of them failed the test. The ratio of the number of rice cookers failed to the number of rice cookers passed is 1 : 63. Find x .

44. Solve the simultaneous equations
$$\begin{cases} 5x + 2y = 31 \\ 3x + 2y = 25 \end{cases}$$

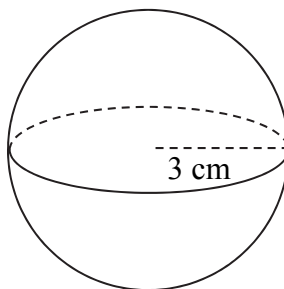
45. In the figure, $AD = CD$ and $\angle ADB = \angle CDB$. Prove that $\triangle ABD \cong \triangle CBD$.



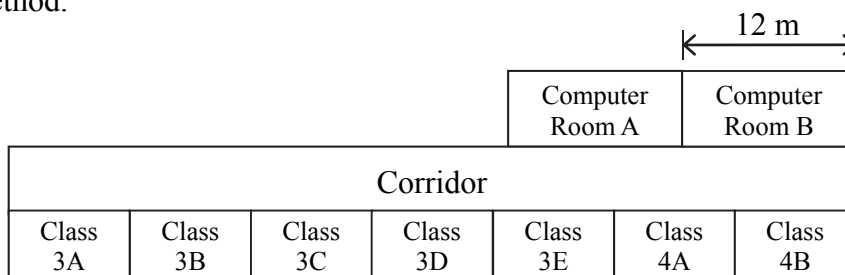
46. In the figure, the radius of sector OAB is 5 cm and $\angle AOB = 140^\circ$. Find the length of $\widehat{AB}$. Correct the answer to 3 significant figures.



47. The figure shows a sphere of radius 3 cm. Find the volume of the sphere. Express the answer in terms of π .



48. In the figure, there are 2 computer rooms and 7 classrooms along the two sides of a corridor. The length of each computer room is 12 m. Estimate the length of the corridor and explain your estimation method.



49. The following data show the marks that 15 students obtained in a dictation (full mark is 50).

24	50	15
45	42	50
18	37	38
48	29	48
12	11	24

According to the above data, complete the stem-and-leaf diagram in the **ANSWER BOOKLET**.

50. The table below shows the weights of 60 suitcases.

Weight (kg)	16 – 20	21 – 25	26 – 30	31 – 35
Frequency	8	32	14	6

Find the mean weight of the 60 suitcases.

END OF PAPER

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Answers written on this page will not be marked.

