



**Education Bureau**  
**Territory-wide System Assessment 2008**  
**Secondary 3**  
**Mathematics**  
**QUESTION BOOKLET**

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**INSTRUCTIONS**

1. There are 53 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. Rough work should be done on the rough work sheet provided.

## 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	$= \frac{1}{3} \times \text{base area} \times \text{height}$

The diagrams in this paper are not necessarily drawn to scale.

**SECTION A:** Choose the best answer for each question. You should mark all your answers in the ANSWER BOOKLET.

1. Which of the following is correct?

- A.  $\sqrt{120} > 11$
- B.  $\sqrt{150} > 12$
- C.  $\sqrt{160} > 13$
- D.  $\sqrt{190} > 14$

2. Which of the following algebraic expressions is equivalent to  $-(3x)^2$  ?

- A.  $3x^2$
- B.  $-3x^2$
- C.  $9x^2$
- D.  $-9x^2$

3.  $-(5a)(3b) =$

- A.  $-5a + 3b$
- B.  $-5a - 3b$
- C.  $-15ab$
- D.  $-2ab$

4. Simplify  $\frac{(c^2)^3}{c^{-3}}$ .

- A.  $c^3$
- B.  $c^8$
- C.  $c^9$
- D.  $c^{11}$

5. 99 is the root of which of the following equations?

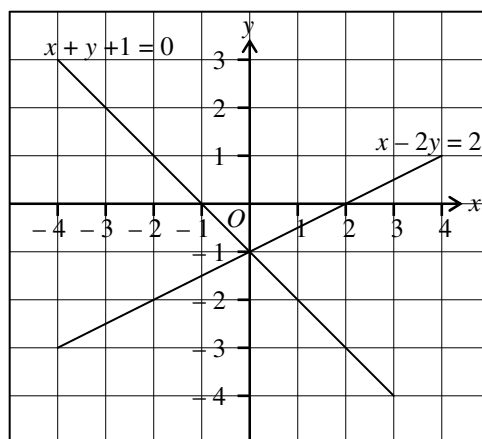
A.  $\frac{x+99}{2} = 50$

B.  $\frac{x-99}{2} = 50$

C.  $\frac{x+1}{2} = 50$

D.  $\frac{x-1}{2} = 50$

6.



Solve graphically  $\begin{cases} x + y + 1 = 0 \\ x - 2y = 2 \end{cases}$ .

A.  $(-1, 0)$

B.  $(0, -1)$

C.  $(2, 0)$

D.  $(0, 2)$

7. In a supermarket, the price of a box of candy was \$  $x$ . Thomas gave the shop assistant \$40 for buying 4 boxes of candy. The shop assistant returned some change to him. Which of the following inequalities can be used to find the range of  $x$ ?

A.  $4x < 40$

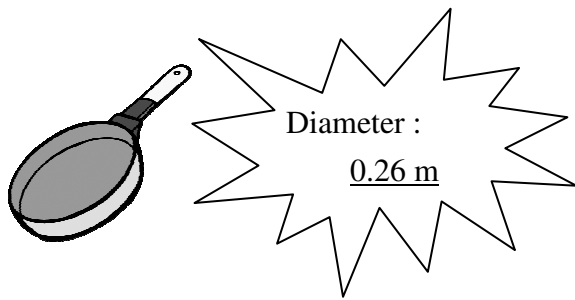
B.  $4x \leq 40$

C.  $4x > 40$

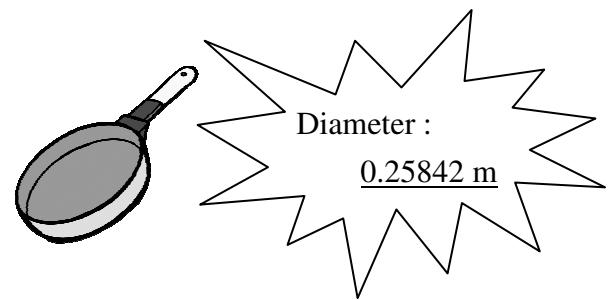
D.  $4x \geq 40$

8. The diameter of a frying pan is shown in each of the following advertisements. Which measurement is expressed in the most appropriate unit and degree of accuracy?

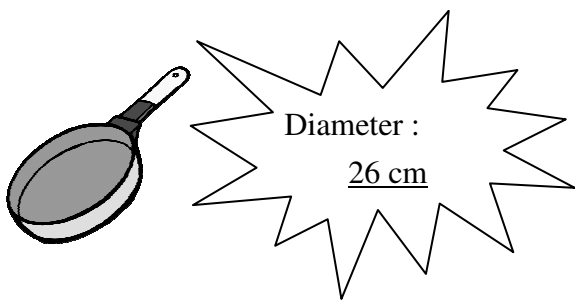
A.



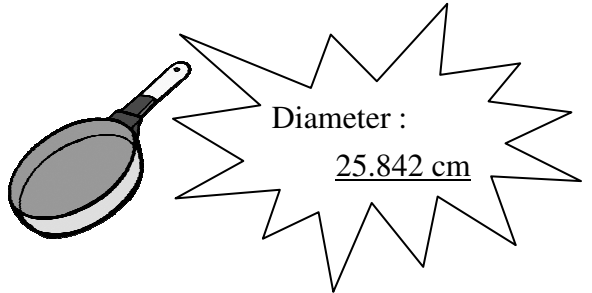
B.



C.

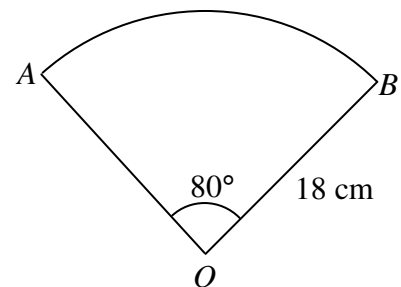


D.

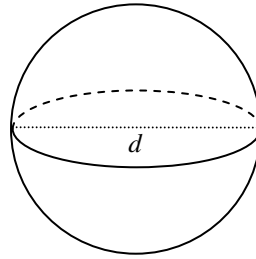


9. In the figure, the radius of the sector  $OAB$  is 18 cm. Find the arc length  $\widehat{AB}$ .

- A.  $4\pi$  cm  
B.  $8\pi$  cm  
C.  $36\pi$  cm  
D.  $72\pi$  cm



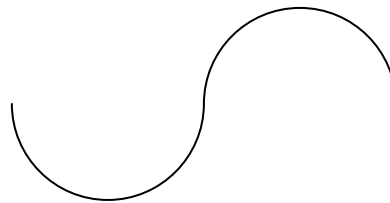
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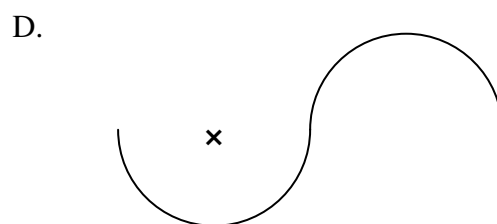
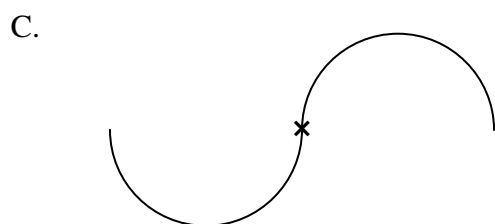
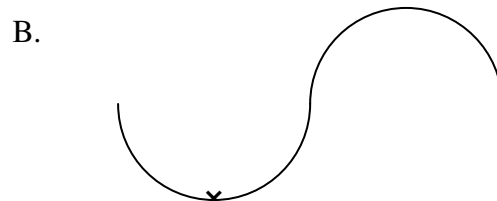
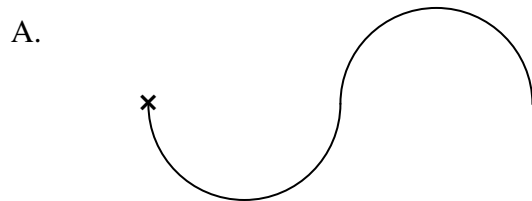
The figure above shows a sphere of diameter  $d$ . Its surface area is  $A$ . Which of the following can be the formula for the volume of the sphere?

- A.  $\pi d$
- B.  $\pi d^2$
- C.  $3A$
- D.  $\frac{1}{6}Ad$

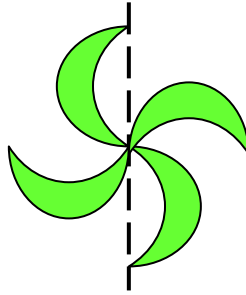
11.



The above figure has rotational symmetry. Which “ $\times$ ” of the below indicates its centre of rotation?

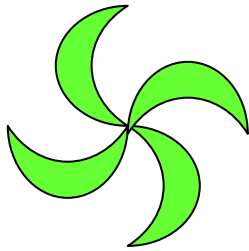


12.

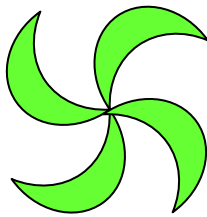


Find the image of the figure after reflecting in the dotted line.

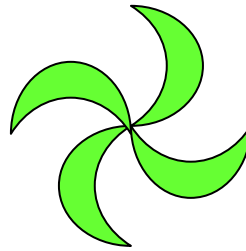
A.



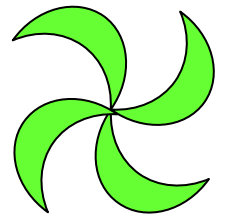
B.



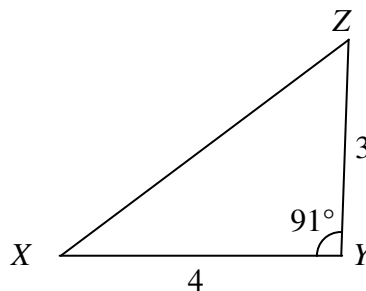
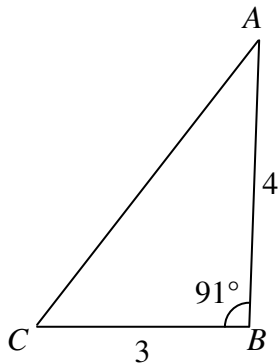
C.



D.



13.

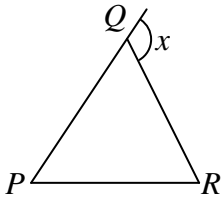


Refer to  $\triangle ABC$  and  $\triangle XYZ$ . Which of the following is correct?

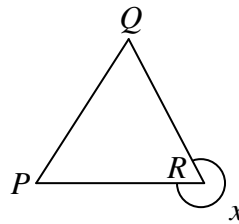
- A.  $\triangle ABC \cong \triangle XYZ$  (RHS)
- B.  $\triangle ABC \cong \triangle XYZ$  (SAS)
- C.  $\triangle ABC \sim \triangle XYZ$  (AAA)
- D.  $\triangle ABC \sim \triangle XYZ$  (3 sides proportional)

14. Which of the following figures shows that  $x$  is an exterior angle of  $\triangle PQR$  ?

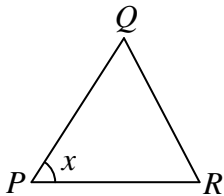
A.



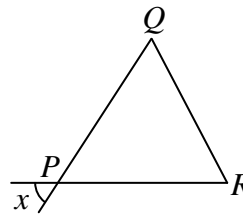
B.



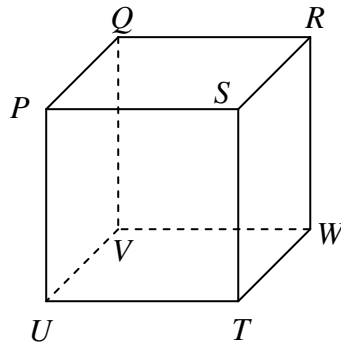
C.



D.



15.



The above figure shows a cube  $PQRSTU VW$ . Which of the following is an axis of rotational symmetry of the cube?

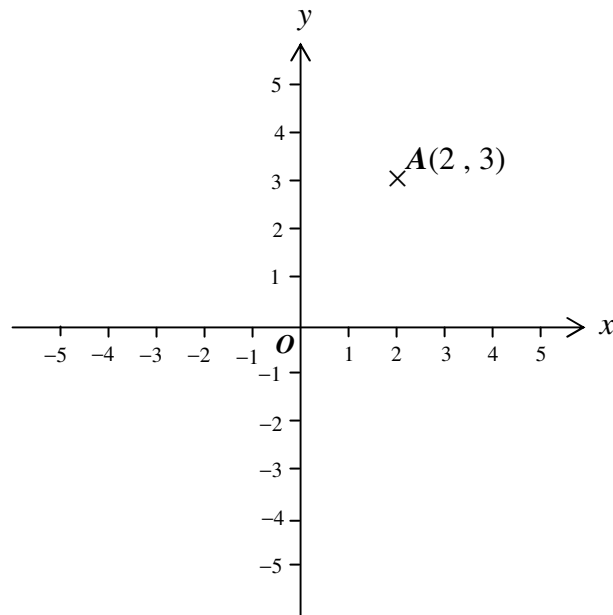
- A.  $PT$
- B.  $PS$
- C.  $PW$
- D.  $PR$

16. Given  $ABC$  is a triangle where  $AB = 18$  cm,  $BC = 24$  cm and  $CA = 30$  cm. Which of the following statement is correct?

- A.  $\triangle ABC$  is a right-angled triangle and  $\angle ABC = 90^\circ$ .
- B.  $\triangle ABC$  is a right-angled triangle and  $\angle BCA = 90^\circ$ .
- C.  $\triangle ABC$  is a right-angled triangle and  $\angle CAB = 90^\circ$ .
- D.  $\triangle ABC$  is NOT a right-angled triangle.



17.

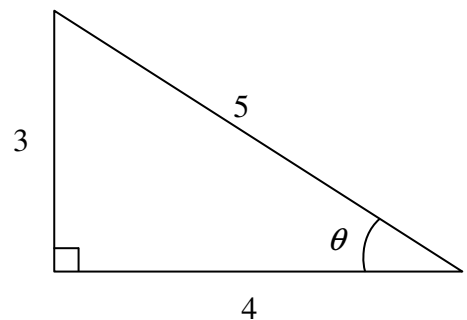


If the point  $A(2, 3)$  is rotated  $90^\circ$  about the origin  $O$  in the anticlockwise direction to point  $A'$ , then the coordinates of  $A'$  are

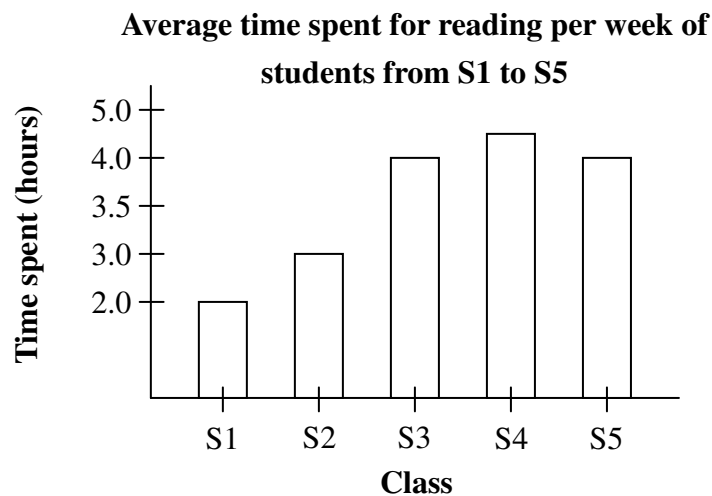
- A.  $(2, -3)$ .
- B.  $(3, -2)$ .
- C.  $(-2, 3)$ .
- D.  $(-3, 2)$ .

18. Refer to the figure. Find the value of  $\tan \theta$ .

- A.  $\frac{3}{4}$
- B.  $\frac{3}{5}$
- C.  $\frac{4}{3}$
- D.  $\frac{4}{5}$



19. An organization wants to know the daily working hours of people living in Wong Tai Sin. Which of the following is the most suitable method?
- A. Use the data collected 10 years ago.
  - B. Interview all workers of a company in Wong Tai Sin.
  - C. Send questionnaires to residents living in Wong Tai Sin.
  - D. Estimate the number of passengers in Wong Tai Sin MTR station from 5 p.m. to 11 p.m.
20. The following graph shows the average time spent for reading per week of students from S1 to S5 of a secondary school:



Which of the following statements best explains why a reader could be misled by the graph?

- A. The scale of horizontal axis is not consistent.
- B. The scale of vertical axis is not consistent.
- C. The number of students of each level is not shown in the graph.
- D. The time spent (in hours) is not expressed in integers.

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

21. Determine whether the value in each of the following situations is the exact value or the estimated value.

(i) An adult ticket of a theme park costs \$300.



(ii) It takes 1 hour for Susan to travel from Shatin to Central by bus.



22. Use scientific notation to represent 0.000 000 023 5 .

23. Joan deposits \$15 000 in a bank at a simple interest rate of 3% p.a. How many years will it take for her to earn a total interest of \$ 900 ?

24. The weight of Jackson is 40 kg. Susan is 10 kg heavier than Jackson. Find the ratio of the weight of Jackson to the weight of Susan.

25. Dennis wanted to buy 9 train tickets. He gave the booking clerk  $x$  fifty-dollar notes, and received \$5 in change. Find the price of each ticket in terms of  $x$ .

26. Find the coefficient of  $y^4$  in the polynomial  $-1 + 3y - 4y^2 - 2y^4$ .

27. Simplify  $(x + 2y) - (3y - 2x)$ .

28. Simplify  $\frac{(m^{-2})^{-3}n^6}{n^2}$ .

29. Factorize  $4 - 9y^2$ .

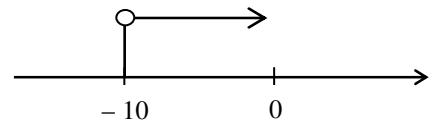
30. Solve  $2(x+1) = -4$ .

31. Draw the graph of  $x + y = 1$  on the given rectangular coordinate plane in the ANSWER BOOKLET.

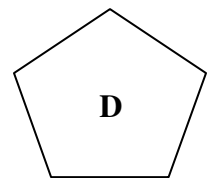
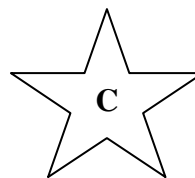
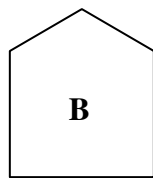
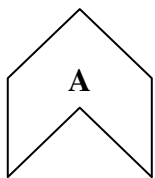
32. Expand  $(2x - y)^2$ .

33. Refer to the ANSWER BOOKLET, fill in the boxes with  $>$  or  $<$  to express the relations between the numbers.

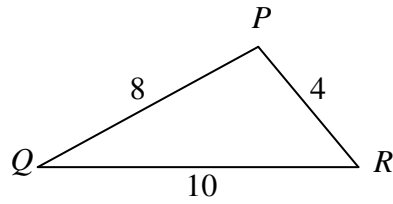
34. According to the diagram, write down an inequality in  $x$ .



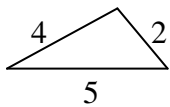
35. Which of the following are convex polygons?  
(There may be more than one answer.)



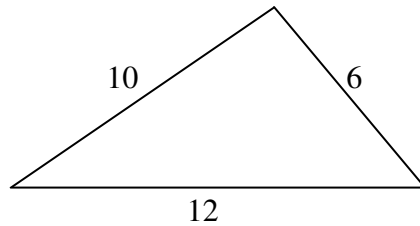
36.



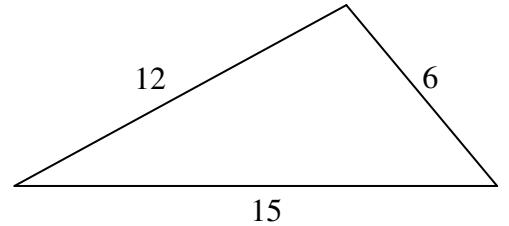
Which of the following triangles are similar to  $\triangle PQR$  as shown in the above figure?  
 (There may be more than one answer.)



**Triangle A**

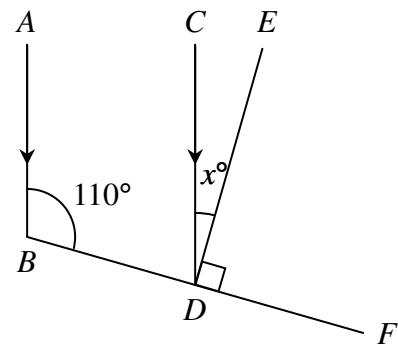


**Triangle B**

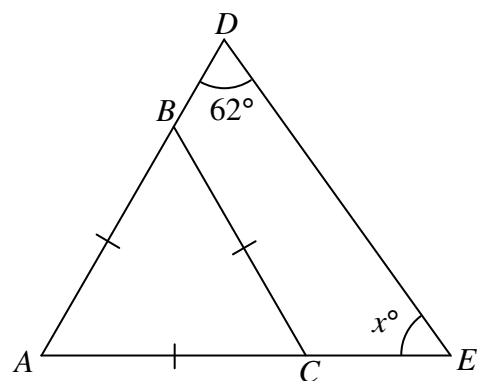


**Triangle C**

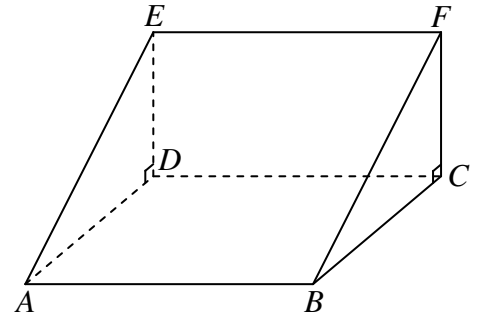
37. In the figure,  $AB \parallel CD$  and  $\angle EDF = 90^\circ$ .  
 Find the value of  $x$ .



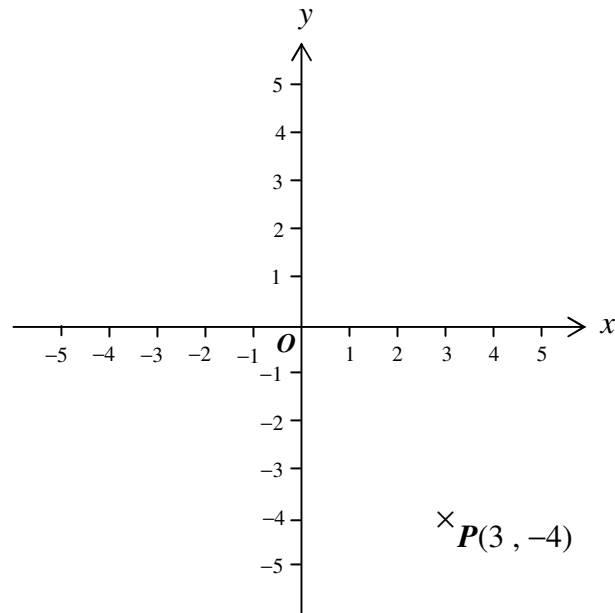
38. In the figure,  $\triangle ABC$  is an equilateral triangle.  
 $ABD$  and  $ACE$  are straight lines. Find the value of  $x$ .



39. The figure shows a triangular prism.  $ABCD$  and  $DCFE$  are rectangles.  $ABCD$  is a horizontal plane and  $DCFE$  is a vertical plane. Name the angle between the inclined plane  $ABFE$  and the vertical plane  $DCFE$ .

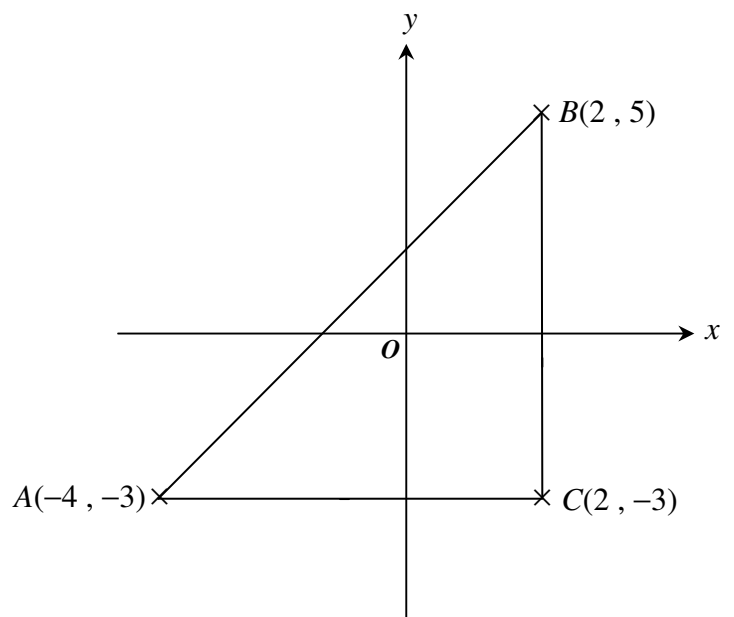


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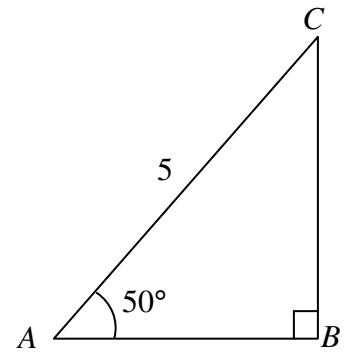


If the point  $P(3, -4)$  is translated 4 units upwards to point  $P'$ , find the coordinates of  $P'$ .

41. Find the area of  $\triangle ABC$  in the figure.



42. Find the length of  $BC$  in the figure (correct to 1 decimal place).

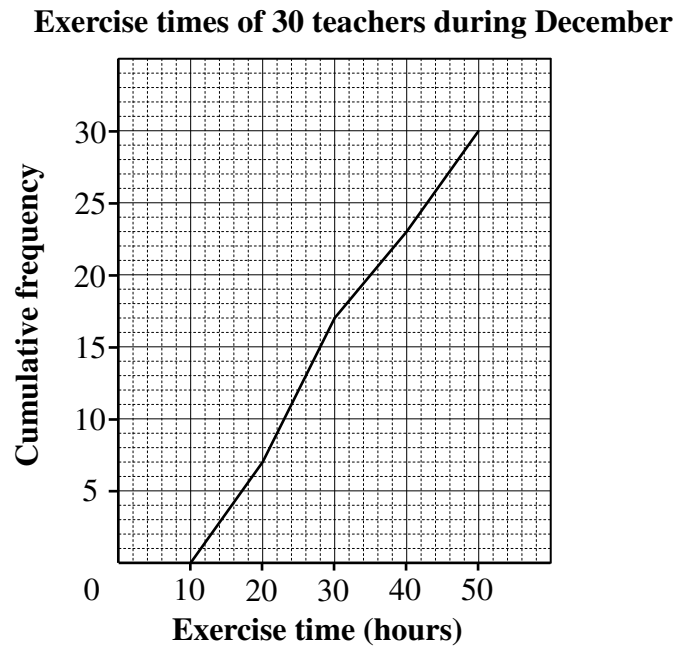


43. Winnie surveyed the amounts of daily pocket money of some students. The results are shown in the following stem-and-leaf diagram:

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

- (a) How many students answered this survey?
- (b) How many students have \$24 daily pocket money?
- (c) What is the largest amount of daily pocket money among the students?

44. The exercise times of 30 teachers during December were recorded. The result is shown in the following cumulative frequency polygon:



Find the median of exercise times.

45. The following table shows the monthly incomes of 50 families:

Monthly income (\$)	Frequency
7001 – 8000	7
8001 – 9000	10
9001 – 10 000	13
10 001 – 11 000	20

Find the modal class.

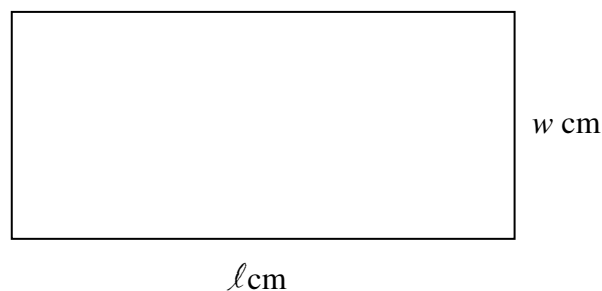


**SECTION C: All working must be clearly shown. Write the mathematical expressions, answers and statements/conclusions in the spaces provided in the ANSWER BOOKLET.**

46. Henry bought a gold watch for \$50 000 three years ago. Its value increased by 10% each year. Find the present value of the gold watch.



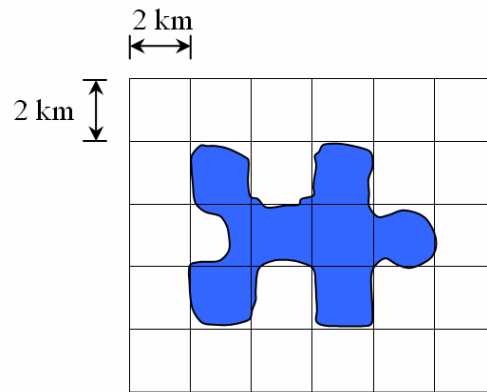
47. Mr Chan is going to Shanghai for a business trip. He exchanges HK\$ 4000 in the bank for Renminbi (¥). The exchange rate is HK\$ 100 to ¥ 90. Find the amount in Renminbi (¥) he should receive.
48. The figure below shows a rectangle of length  $\ell$  cm and width  $w$  cm .



The perimeter of the rectangle  $P$  cm can be found by the formula  $P = 2(\ell + w)$ .

- (a) Make  $\ell$  the subject of the formula.
- (b) When  $P = 18$  and  $w = 3$ , find the value of  $\ell$  .

49.



The figure above shows an island on a map.

- (a) Estimate the area of the island.
- (b) Explain your method of estimation.

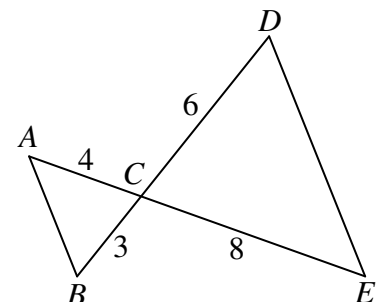
50.



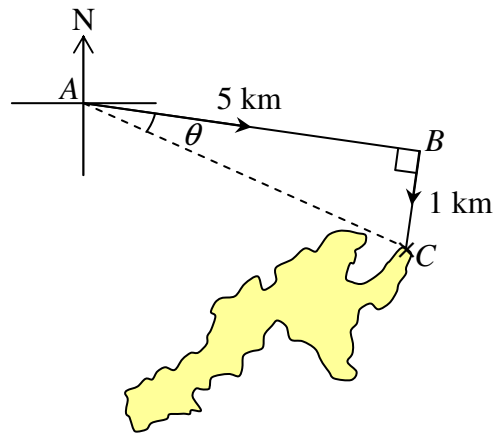
In the figure, the signboard of an amusement game centre is in the shape of a sector. Its radius and angle of the sector are 1.4 m and  $300^\circ$  respectively. Find the area of the signboard correct to 1 decimal place.

- 51. In the figure,  $ACE$  and  $BCD$  are straight lines.  
 $AC = 4$ ,  $BC = 3$ ,  $CD = 6$  and  $CE = 8$ .

Prove that  $\triangle ABC \sim \triangle EDC$ .



52.



As shown in the above figure, a boat sails 5 km from  $A$  to  $B$  at a true bearing of  $100^\circ$ . It then turns  $90^\circ$  to its right and sails 1 km to pier  $C$ .

- (a) Find the value of  $\theta$  correct to the nearest degree.
- (b) Find the true bearing of  $C$  from  $A$  (correct to the nearest degree).

53. The following is the cumulative frequency table for the time taken by 30 students to do their projects:

Time less than (hours)	1	2	3	4	5
Total number of students	3	12	23	28	30

According to the data, draw the cumulative frequency curve.

**END OF PAPER**

