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Education Bureau
Territory-wide System Assessment 2009
Secondary 3
Mathematics
QUESTION BOOKLET

INSTRUCTIONS

1. There are 49 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.

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

FORMULAS FOR REFERENCE

Sector	Arc length	$= 2\pi r \times \dfrac{\theta}{360^{\circ}}$
	Area	$= \pi r^2 \times \dfrac{\theta}{360^{\circ}}$
Sphere	Surface area	$= 4\pi r^2$
	Volume	$= \dfrac{4}{3}\pi r^3$
Cylinder	Curved surface area	$= 2\pi rh$
	Volume	$= \pi r^2 h$
Cone	Curved surface area	$= \pi rl$
	Volume	$= \dfrac{1}{3}\pi r^2 h$
Prism	Volume	$=$ base area $\times$ height
Pyramid	Volume	$= \dfrac{1}{3} \times$ base area $\times$ height

SECTION A: Choose the best answer for each question.

You should mark all your answers in the **ANSWER BOOKLET.**

1. An AIDS virus is 1×10^{-7} m long. 1×10^{-7} m is equal to

   A.   0.0000001 m.
   B.   0.000001 m.
   C.   1000000 m.
   D.   10000000 m.

2. There are 1100 students in Excellent Secondary School and 500 of them are girls. Find the ratio of number of boys to number of girls in that school.

   A.   11:5
   B.   5:11
   C.   6:5
   D.   5:6

3. Mary bought 0.6 kg of pork chop with $60. Find the selling price of pork chop per kg.

   A. $ 0.01
   B. $ 36
   C. $ 59.4
   D. $ 100

4. Which of the following is a polynomial in x?

   A. $x^2 + 2x + \dfrac{1}{x}$

   B. $x^2 + 2x + \dfrac{1}{2}$

   C. $\dfrac{1}{x^2 + 2x + 1}$

   D. $x^2 + 2\sqrt{x} + 1$

5. Which of the following polynomials is in descending powers of x?

    A. $4 - 2x + 3x^2 - x^3$

    B. $4 + 3x^2 + 2x - x^3$

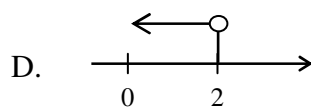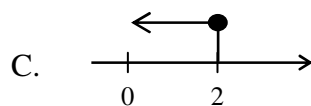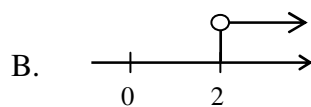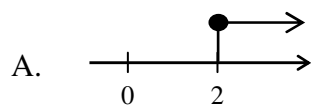   C. $-x^3 + 3x^2 + 2x + 4$

    D. $-x^3 + 2x + 3x^2 + 4$

6. $(3x^3)(-2x^3) =$

    A. 1 .

    B. x^3 .

    C. $-6x^3$.

    D. $-6x^6$.

7. Which of the following equations has 2009 as the root?

    A. $2(2010 - x) = 1$

    B. $2(2009 - x) = 1$

    C. $x + 1 = 2010$

    D. $x + 1 = 2009$

8. Which of the following diagrams represents $x > 2$?

    A.

    B.

    C.

    D.

9. Which of the following is an identity?

    A. $x^2 = 0$
    B. $3x = 6$
    C. $3x - 2 = 2 - 3x$
    D. $2(x + 3) - 2 = 2(x + 2)$

10. Suki needs to measure the length of the East Rail Line on the map. Which of the following is the most accurate method?

    A. Use a ruler to measure the straight line distance between the first and the last station of the East Rail Line on the map.
    B. Use a ruler to measure the straight line distance between each station of the East Rail Line on the map, and add these distances together.
    C. Use a thread to place along the East Rail Line on the map, and measure the length of the thread.
    D. Use rubber bands to place along the East Rail Line on the map, and measure the length of the rubber bands.

11. In the figure, the volume of sphere A is 8 times that of sphere B. The diameter of sphere A is 16 cm. Find the diameter of sphere B.

    A. 1 cm
    B. 2 cm
    C. 4 cm
    D. 8 cm

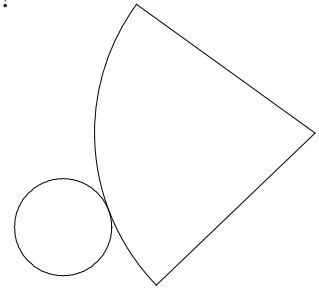Sphere A

16 cm
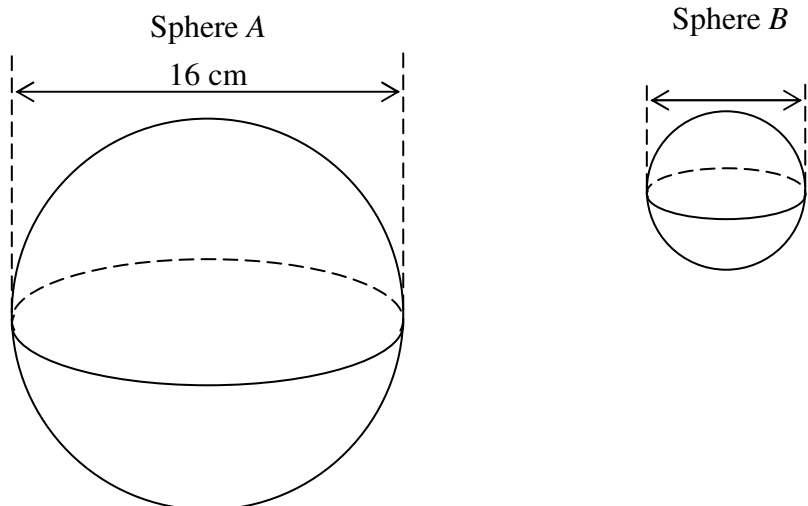
Sphere B

12. The angle marked in the figure is $180°$. Which type of angle is it?

180°

    A. Acute angle
    B. Obtuse angle
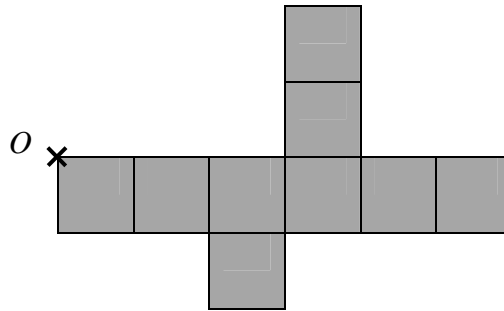   C. Straight angle
    D. Reflex angle
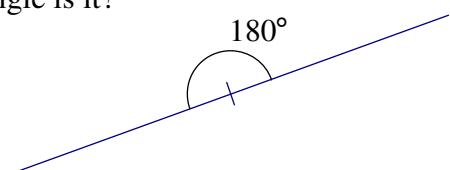
13. Which of the following 3-D figures can be made by the net on the right?

   A. Cylinder
   B. Cone
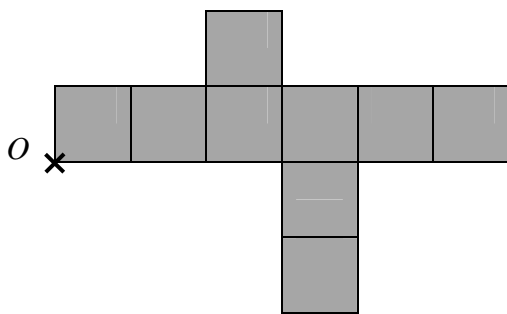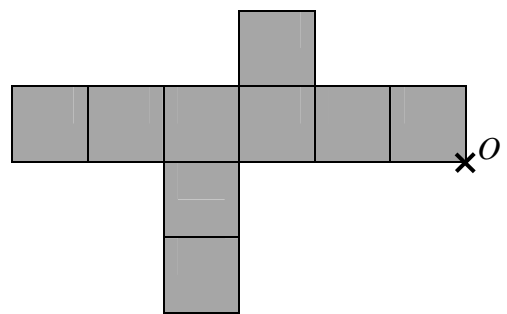   C. Sphere
   D. Regular tetrahedron

14.

Find the image of the above figure after rotating clockwise about O through 180°.
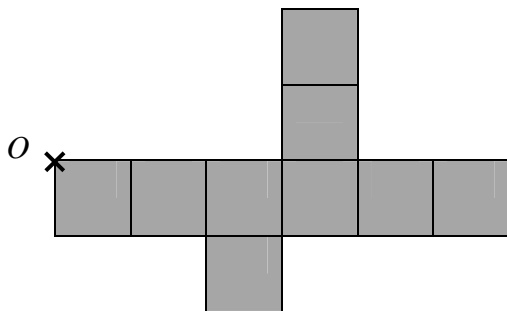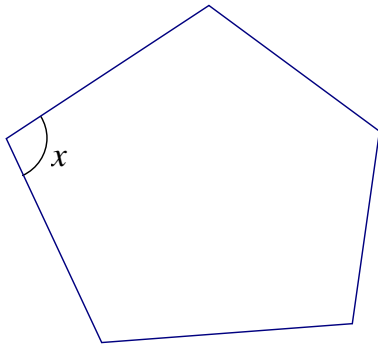
A.

B.

C.

D.
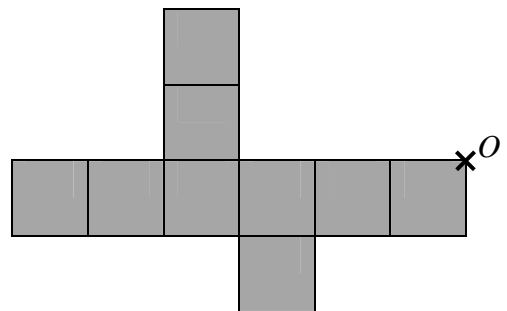
15. Will the size and shape of the figure   be changed after a single translation?

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

16. Which of the following figures shows that x is an exterior angle of polygon?
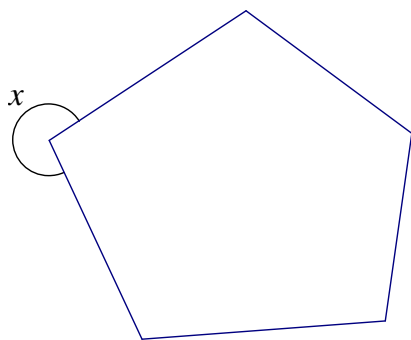
A.
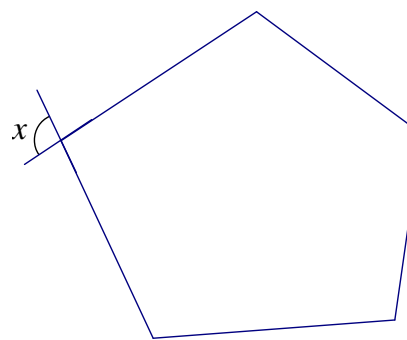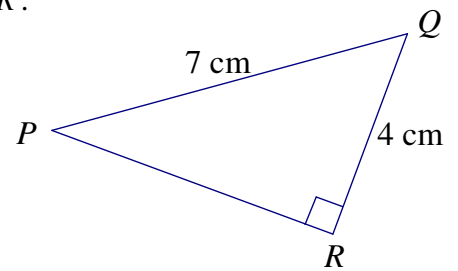

B.
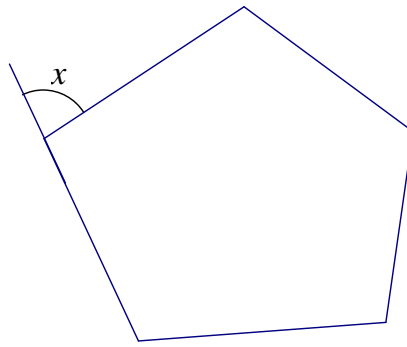
C.

D.

17. In the figure, $\angle PRQ = 90°$, $PQ = 7$ cm, $QR = 4$ cm. Find PR.

  A. $\sqrt{33}$ cm
  B. 33 cm
  C. $\sqrt{65}$ cm
  D. 65 cm

18. $A\,(2\,,\,3)$ and $B\,(-4\,,\,1)$ are two points on straight line L in the rectangular coordinate plane. Find the slope of L.

  A. 3
  B. $\dfrac{1}{3}$
  C. -2
  D. $-\dfrac{1}{2}$

19. William needs to collect the data of air pollution indices of Sha Tin in the past year.   Which of the following is the most suitable method?

    A.   Go to Sha Tin to observe the air pollution there.

    B.   Send questionnaires to people living in Sha Tin.

    C.   Search for information from the webpage of Environmental Protection Department.

    D.   Interview people living in Sha Tin by phone.

20. The following chart shows the blood type distribution of a country's population:

Blood type	Percentage of population
O	45%
A	38%
B	11%
AB	6%

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

    A.   Pie chart

    B.   Broken line graph

    C.   Histogram

    D.   Scatter 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.
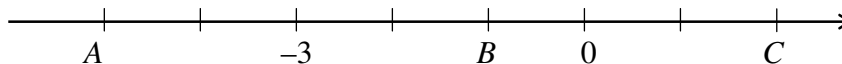
22. Determine whether the values mentioned in the following situations are exact or estimated values.

 (i)   There were **28** participants in a Marathon Race.

 (ii)   The viewing rate of a Marathon Race on a TV station was **47%**.

23. Round off 159.972 to three significant figures.

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

$$1 , 1 , 2 , 3 , 5 , 8 , 13 , x , y , \ldots$$

25. The expense $\$E$ of a Christmas party can be calculated by the following formula:

$$E = 120 + 25x$$

where x is the number of participants of the party.   If the expense of the party was $670, find the number of participants.

26. Simplify $(x^3 + 5x) - (x^2 - 3x)$.

27. Factorize $2x^2 + 8x^4$.

28. Solve $1 - \dfrac{x}{2} = 6$.

29. Expand $(3x + 1)^2$.

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

31. Which of the following figures **MUST** be regular polygon(s)?
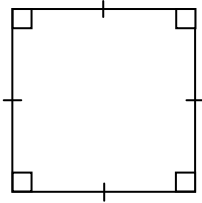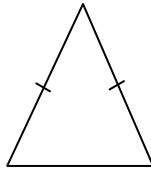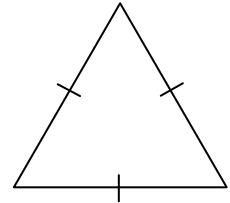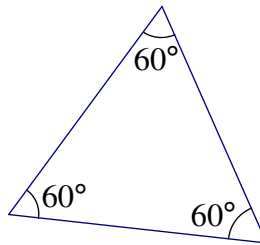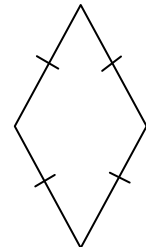   (There may be more than one answer.)

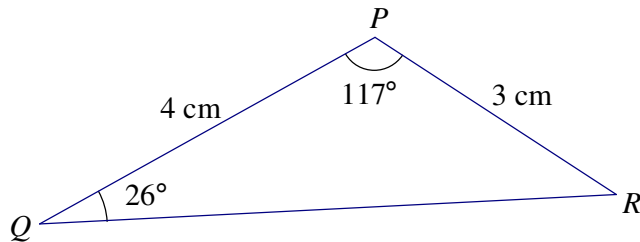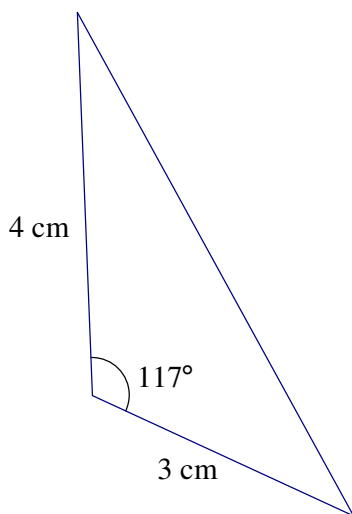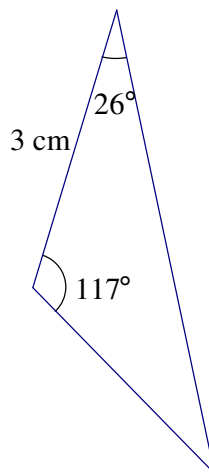Figure A

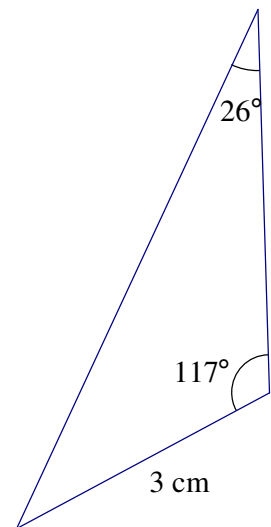Figure B

Figure C

Figure D

Figure E

Figure F

32.

Which of the following triangles is/are congruent to ΔPQR in the figure above?
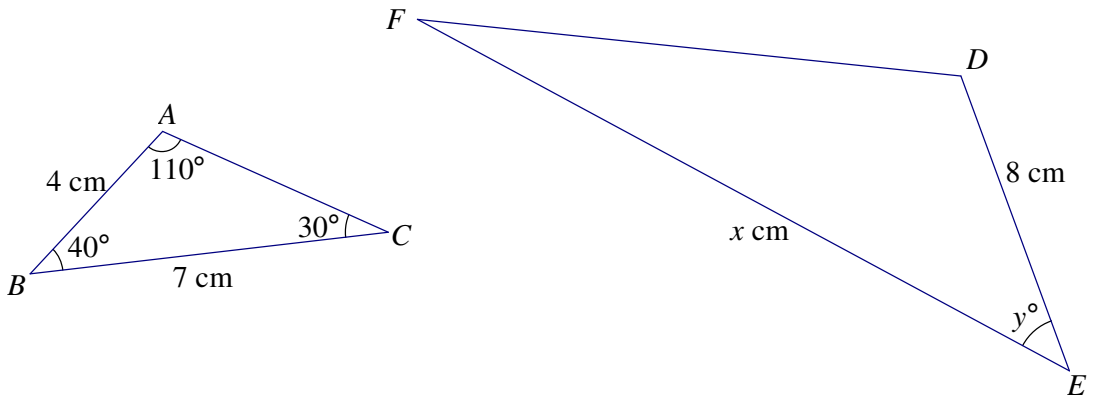(There may be more than one answer.)

Triangle *A*

Triangle *B*

Triangle *C*

33.

In the figure, $\triangle ABC \sim \triangle DEF$. Find
(a) the value of x;
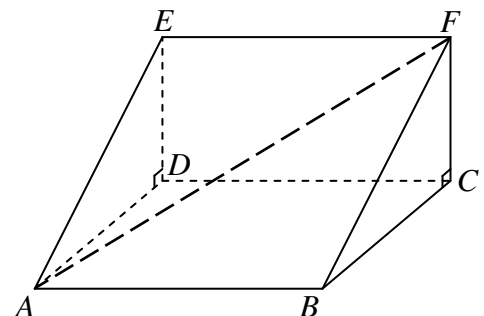(b) the value of y.

34. In the figure, $\cos\theta = 0.82$. Find θ correct to the nearest 0.1°.
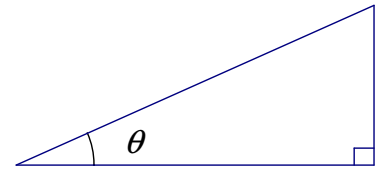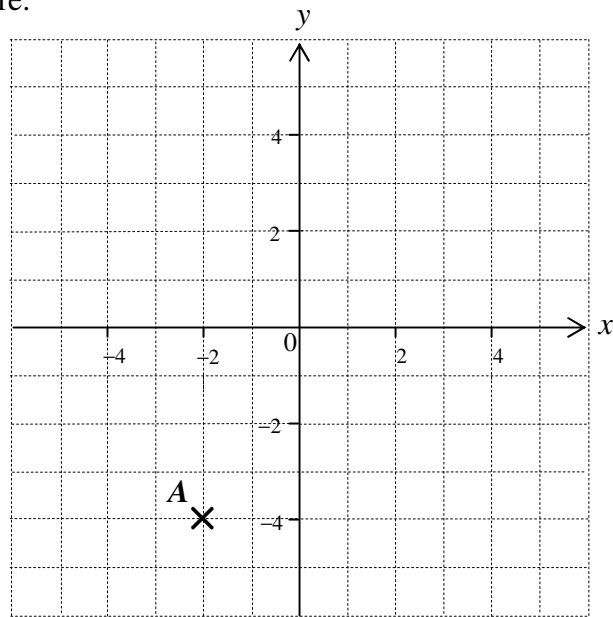

35. According to the figure, find the value of x.
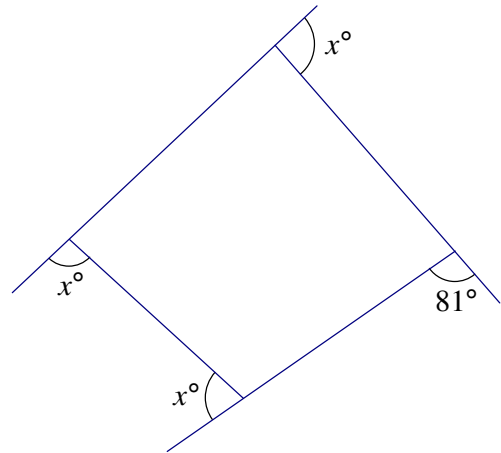
36. The figure shows a triangular prism. *ABCD* and *DCFE* are rectangles. *ABCD* is a horizontal plane, and *DCFE* is a vertical plane. Name the projection of line *AF* on vertical plane *DCFE*.

37. Find the coordinates of point *A* in the figure.

38. Mary plans to study the consumer styles of housewives.   The study is conducted in the following four stages.

    Arrange these stages.   For example: (1) → (2) → (3) → (4)

    (1)   Analyse graphs and data for conclusion.

    (2)   Organise the data of consumer styles from questionnaires.

    (3)   Send questionnaires on consumer styles to housewives.

    (4)   According to various consumer styles, use suitable graphs to represent data.

39. The Parent-teacher Association sold raffle tickets to parents attending the Parents' Day.   The results were as follows:

Number of raffle tickets bought	0 – 2	3 – 5	6 – 8
Number of people	31	67	2

What was the mean number of raffle tickets bought per person?

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 map shows the locations of Piers *A*, *B* and *C* and the distance between them:
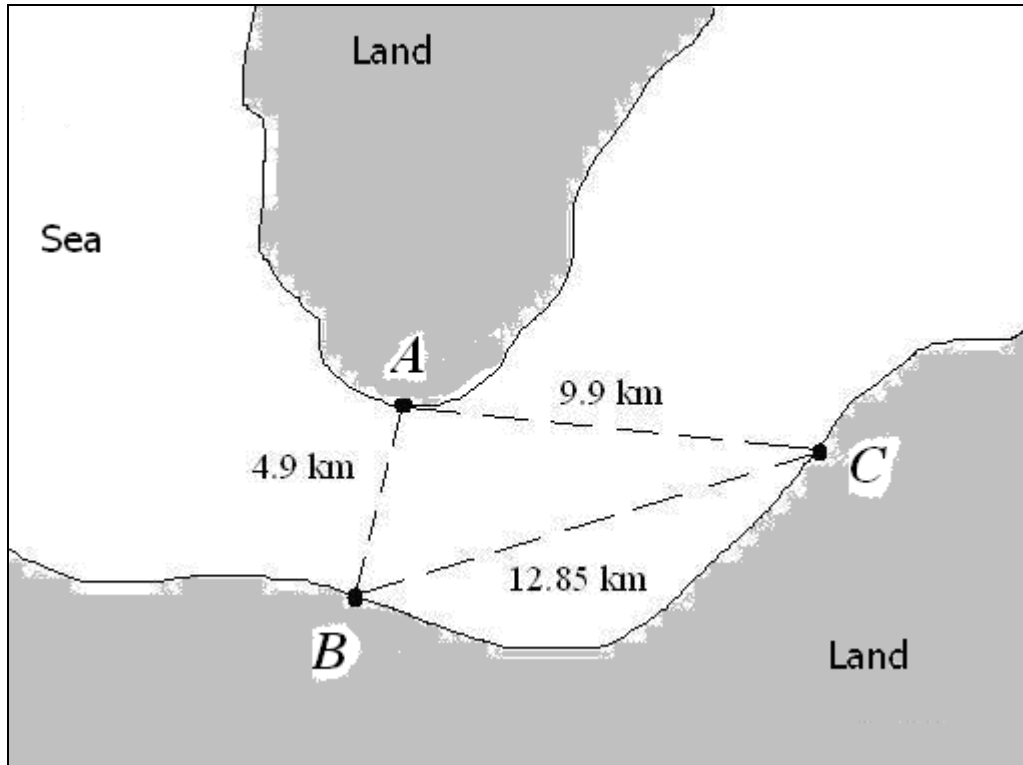
Every day from Monday to Friday, Mr. Wong sails his boat from Pier *A* to Pier *B*, then he sails to Pier *C*, and returns to Pier *A* finally.   Mr. Wong takes rest on Saturdays and Sundays.

Estimate the total sailing distance of Mr. Wong per week, and explain your estimation method briefly.

41.   Suki made a deposit into a bank.   The simple interest rate was 2% p.a.   She received $360 interest after three years.   Find the principal of Suki's deposit.

42.   The present value of a computer is $6500.   It depreciates by 40% each year.   Find the value of the computer after three years.

43.   Complete the following table for the equation $2y = x + 1$ in the ANSWER BOOKLET.

| x	-3	0	3
y			2

Draw the graph of this equation on the rectangular coordinate plane given in the ANSWER BOOKLET.

44. The ticket prices of a fast ferry were $90 and $70 for adult and child respectively. On a ferry, 122 passengers were on board, in which the number of adults was x and the number of children was y. The total ticket income was $10 200.

    (a) According to the above description, write a pair of equations in x and y.
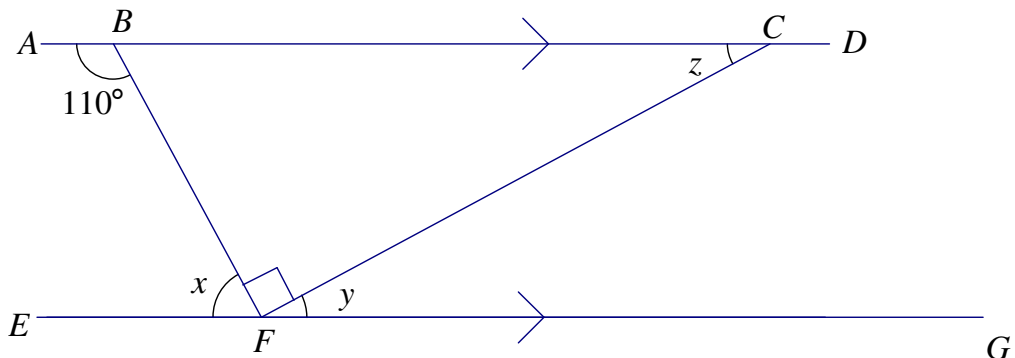   (b) How many children were on the fast ferry?

45. In the figure, the radius OA of the circle is 3 cm, $\angle AOB = 100°$. Find the length of $\overset{\frown}{ACB}$ correct to the nearest 0.1 cm.
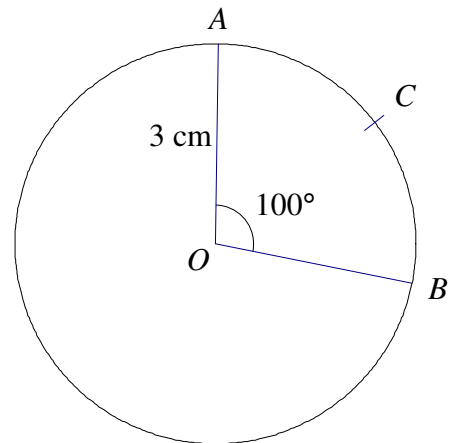
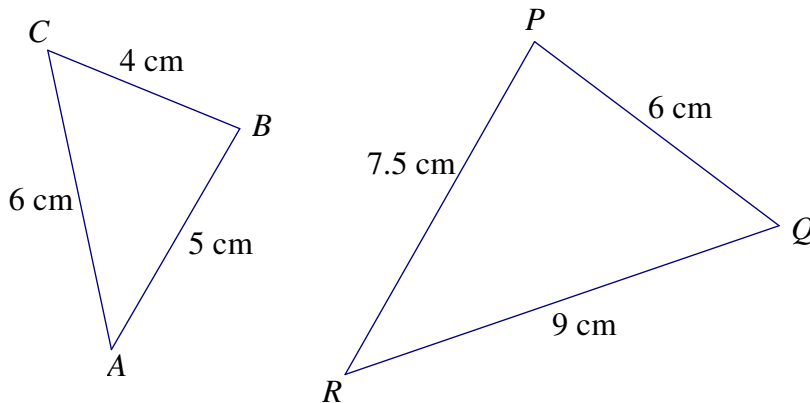46. The diameter of a Fit Ball is 50 cm. Find the surface area of the Fit Ball correct to the nearest cm^2.
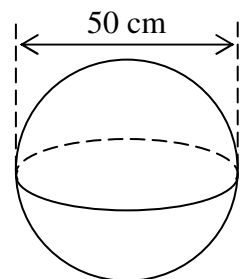
47.

In the figure, $ABCD$ and EFG are parallel straight lines, $\angle ABF = 110°$, $\angle BFC = 90°$. Find x, y and z.

48. Referring to the figure, prove that $\Delta ABC \sim \Delta RPQ$.

49. Thomas is a member of the school basketball team.   In ten matches, his scores are as follows:

Match	Score
1st	3
2nd	2
3rd	4
4th	23
5th	4
6th	3
7th	4
8th	4
9th	17
10th	3

Thomas said, "I usually scored more than 5 in matches, because the arithmetic mean of my scores was 6.7."   Is this statement misleading?   Explain briefly.

END OF PAPER

Prepared by the Hong Kong Examinations and Assessment Authority