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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. There were 26 students in a class. During today's Home Economic lesson, each student brought one to three eggs. Which of the following numbers **CANNOT** be the total number of eggs brought by the class of students?

   A. 16
   B. 26
   C. 55
   D. 75

2. Round off 0.001 849 to 3 decimal places.

   A. 0.00
   B. 0.001
   C. 0.002
   D. 0.001 85

3. 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

4. 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

5. The base fee of Helen's mobile phone plan is $20.   It includes 500 minutes free airtime.   The fee thereafter is $0.1 per minute.

Helen used her mobile phone for more than 500 minutes this month.   If she used the phone for x minutes, which of the following equations can be used to find Helen's mobile phone fees $\$C$ this month?

A. $C = 20 + (0.1)x$

B. $C = 20 + (0.1)x - 500$

C. $C = 20 + (500 - x)(0.1)$

D. $C = 20 + (x - 500)(0.1)$

6. Simplify $3x^3 + 2x^3$.

A. $5x^3$

B. $6x^3$

C. $5x^6$

D. $6x^6$

7. Mandy has pocket money $\$x$.   Clare has pocket money $47, which is $10 less than three times Mandy's amount.   Which of the following equations can be used to find the value of x?

A. $3x = 47 - 10$

B. $3x - 10 = 47$

C. $3(47) = x - 10$

D. $3(47) - 10 = x$

8. Karen has $150.   She needs to buy x egg tarts for the party.   Each egg tart costs $3.   Which of the following inequalities gives the range of x?

A. $x + 3 \geq 150$

B. $x + 3 \leq 150$

C. $3x \geq 150$

D. $3x \leq 150$

9.
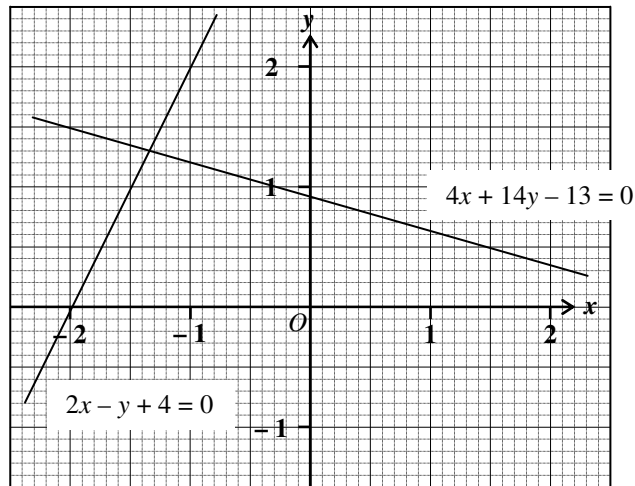
The figure above shows the graphs of $4x + 14y - 13 = 0$ and $2x - y + 4 = 0$.

Solve $\begin{cases} 4x + 14y - 13 = 0 \\ 2x - y + 4 = 0 \end{cases}$ graphically.

    A.   The exact solution is $(-1.3, 1.3)$.

    B.   The exact solution is $(-1.5, 1.5)$.

    C.   The approximate solution is $(-1.3, 1.3)$.

    D.   The approximate solution is $(-1.5, 1.5)$.

10.   Which of the following weather reports made use of the most suitable unit and degree of accuracy to express the total rainfall?

    A.   The total rainfall recorded yesterday was 21.4 mm.

    B.   The total rainfall recorded yesterday was 21.423 87 mm.

    C.   The total rainfall recorded yesterday was 0.021 4 m.

    D.   The total rainfall recorded yesterday was 0.021 423 87 m.

11.   The Pure Water Company bought a new water tank.   The tank is a cylinder with diameter 6 m and height 10 m.   Find the volume of the water tank in terms of π.

    A. 60π m^3

    B. 90π m^3
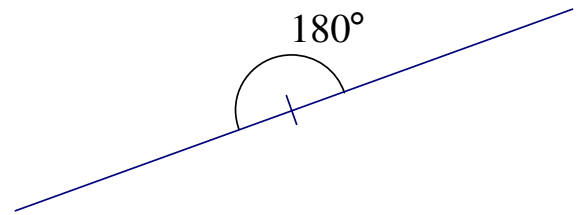
    C. 120π m^3
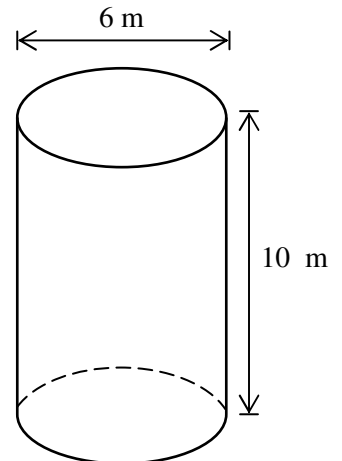
    D. 360π m^3

12. The height of the pyramid in the figure is 20 cm. It has a square base with side length 9 cm. The volume of the pyramid is

    A. 180 cm^3.
    B. 540 cm^3.
    C. 720 cm^3.
    D. 1620 cm^3.
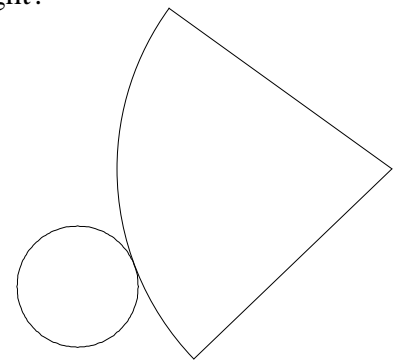
    20 cm

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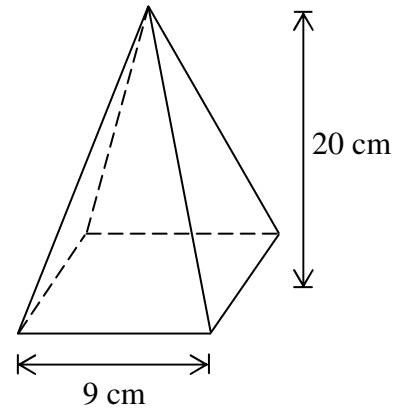
13. The angle marked in the figure is $180°$. Which type of angle is it?

    $180°$

    A. Acute angle
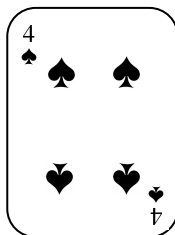   B. Obtuse angle
    C. Straight angle
    D. Reflex angle

14. 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

15. Figure 1   Figure 2
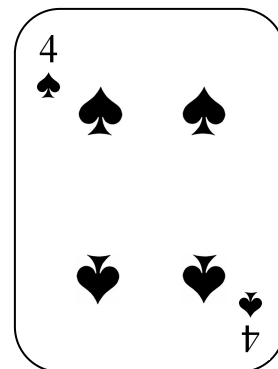
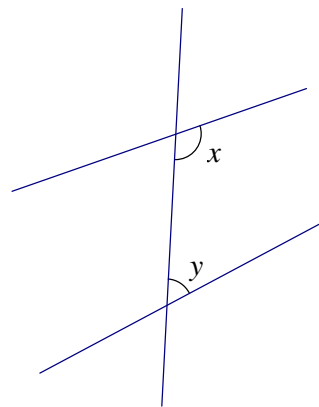   Figure 1 is changed to Figure 2 after a single transformation. The transformation is

    A. rotation.
    B. reflection.
    C. translation.
    D. enlargement.

16. Which of the following figures shows that *x* and *y* are corresponding angles?

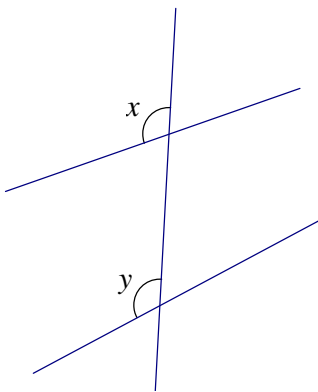A.
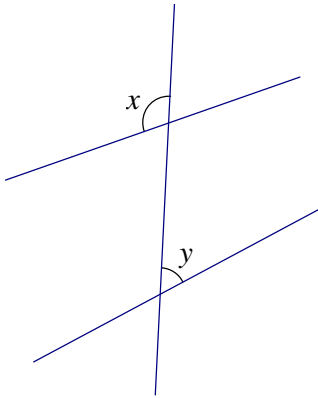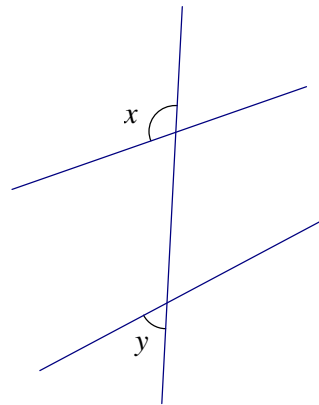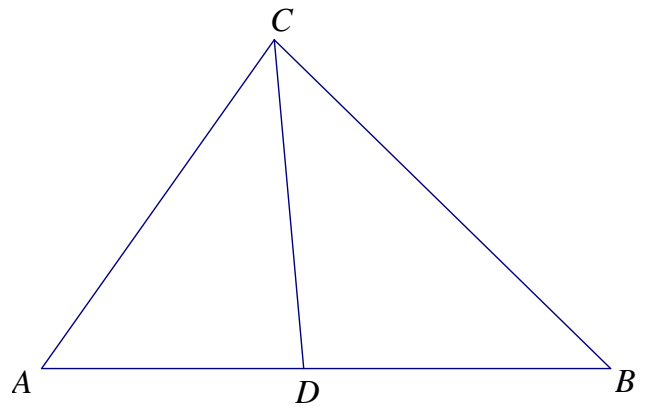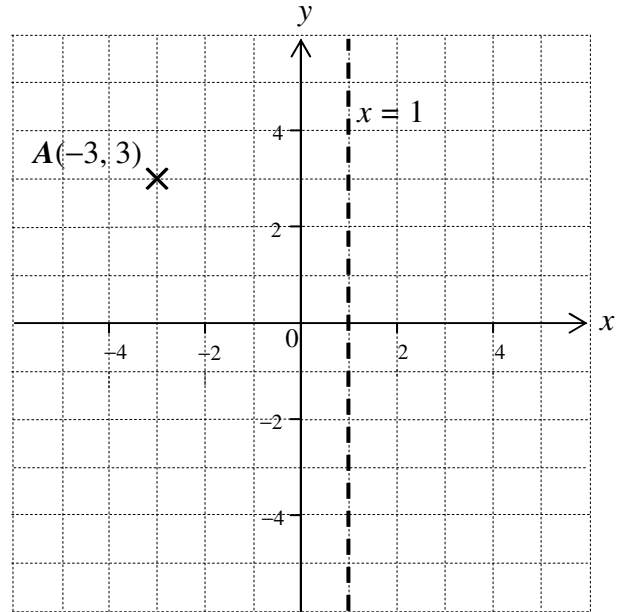

B.

C.

D.

17. In $\triangle ABC$, $\angle ACD = \angle BCD$. *CD* is

A.   a median of $\triangle ABC$.
B.   a perpendicular bisector of $\triangle ABC$.
C.   an altitude of $\triangle ABC$.
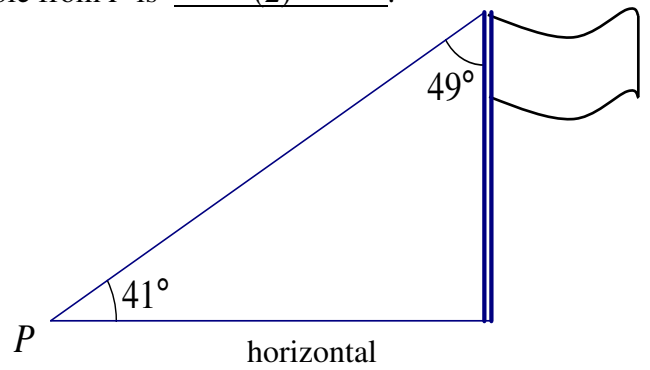D.   an angle bisector of $\triangle ABC$.

18. In the figure, the image of point *A* reflected along straight line *x* = 1 is

A. (1, 3) .
B. (3, 3) .
C. (4, 3) .
D. (5, 3) .

19. In the figure, the ____(1)____ of the top of flagpole from *P* is ____(2)____ .

	(1)	(2)
A.	angle of depression	41°
B.	angle of depression	49°
C.	angle of elevation	41°
D.	angle of elevation	49°

20. After school examination, the results were analysed. It was found that, in general, when the mathematics mark of a student is higher, the science mark is also higher. From which of the following scatter diagrams can this be concluded?

A.

B.

C.

D.
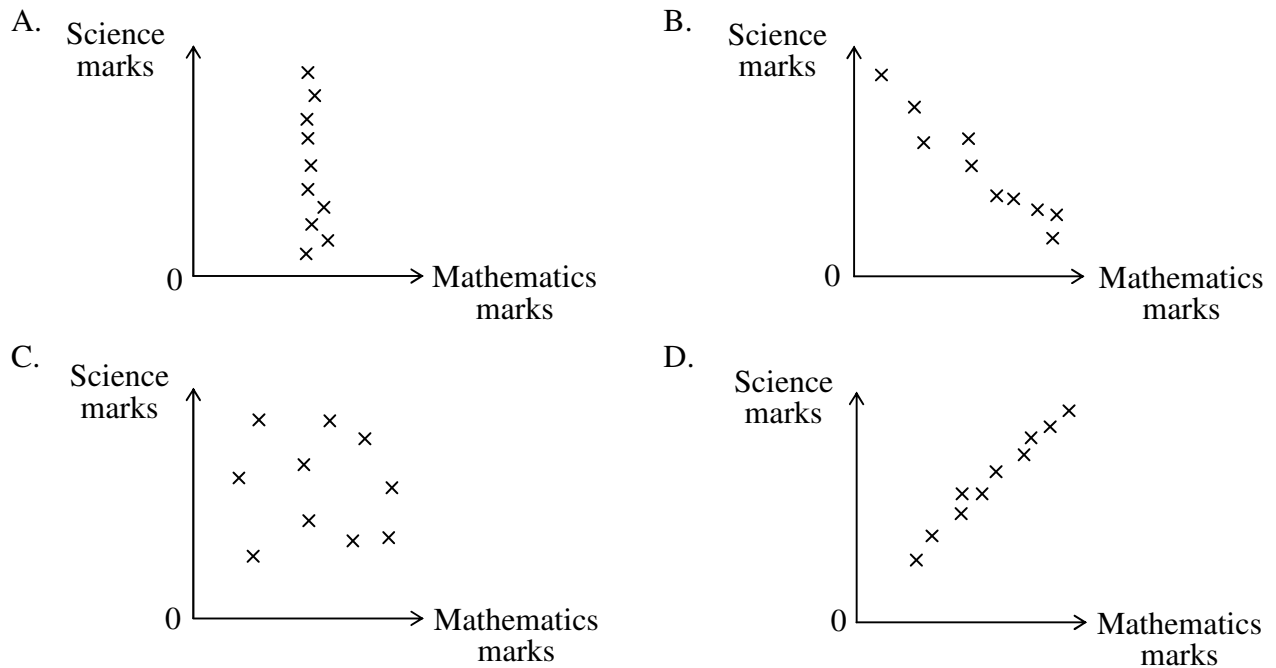
21. The following table lists the number of days of fencing practice of Susan and her teammates last month:

| Fencing team member	Number of days of practice
Susan	14
Karen	10
Yuki	14
Mandy	12

Find the arithmetic mean and median of this set of data.

A. Arithmetic mean = 12.5 days; median = 12 days.
B. Arithmetic mean = 12.5 days; median = 13 days.
C. Arithmetic mean = 14 days; median = 12 days.
D. Arithmetic mean = 14 days; median = 13 days.

22. The manager of a football team used positive and negative numbers to represent goals scored and goals lost. Use suitable numbers to represent the following goals scored and goals lost:

    (i)   4 goals scored
    (ii)   5 goals lost

23. 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%**.

24. Round off 159.972 to three significant figures.

25. It is given that $a : b : c = 4 : 6 : 9$. If $a = 2$, find the values of b and c.

26. The nth term of a sequence is $\dfrac{2n}{n+1}$. Find the value of the 5th term of the sequence.

27. If $4x^3 + 4x^2 - 5x - 3$ is factorized, the result is $(2x+1)(2x+3)(x-1)$.

    What is the result when $(2x+1)(2x+3)(x-1)$ is expanded?
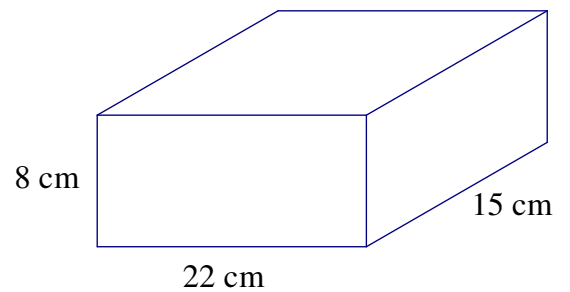
28. Factorize $2x^2 - x - 6$.

29.
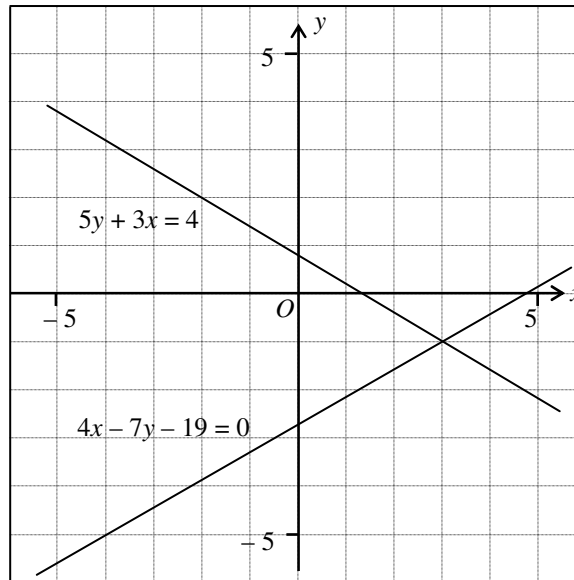
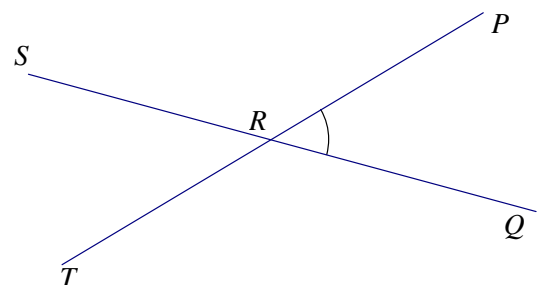The figure shows the graphs of $5y + 3x = 4$ and $4x - 7y - 19 = 0$.

Solve $\begin{cases} 5y + 3x = 4 \\ 4x - 7y - 19 = 0 \end{cases}$ graphically.

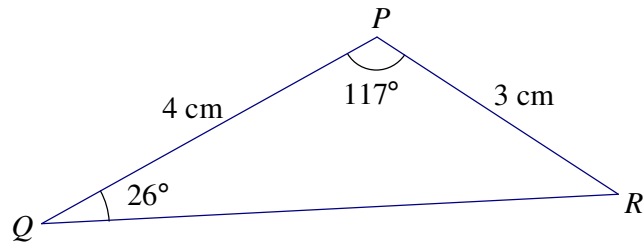30. Make x the subject of the formula $w = \dfrac{10}{x} + 2$.

31. The length, width and height of a cuboid are 22 cm, 15 cm and 8 cm respectively. Find the total surface area of the cuboid.
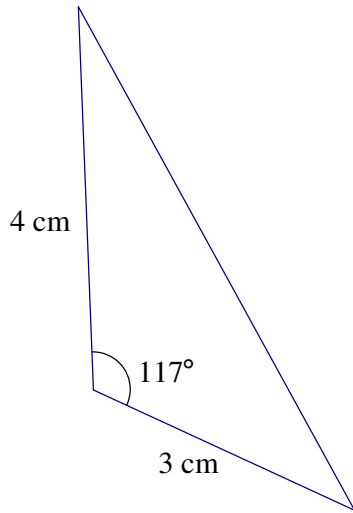

8 cm

15 cm

22 cm

32. Use suitable notations and letters to represent the angle marked in the figure.
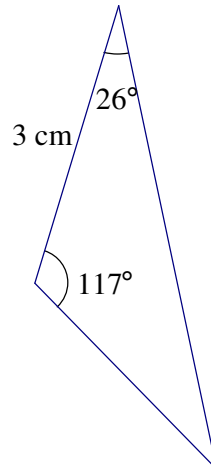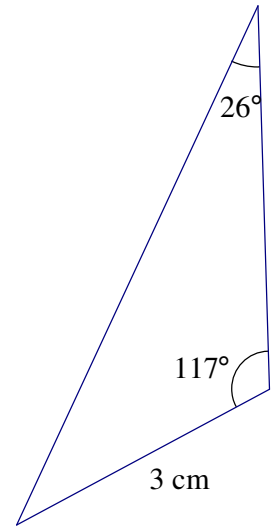
33.

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

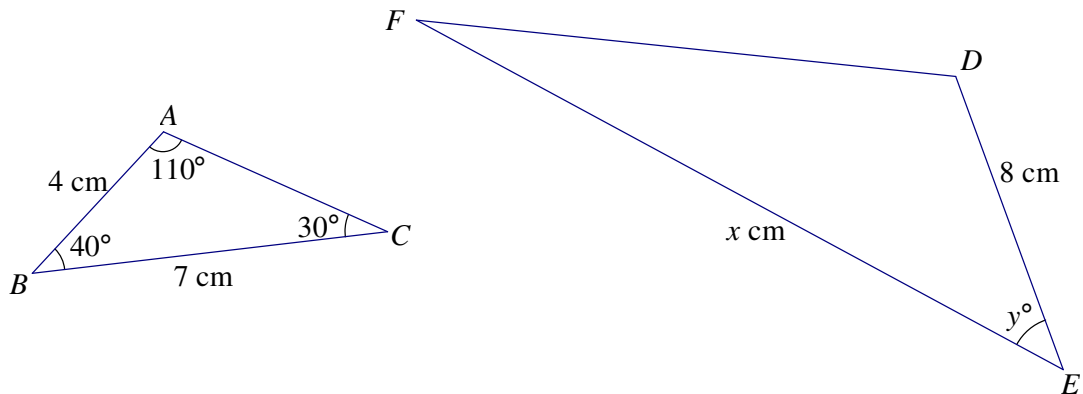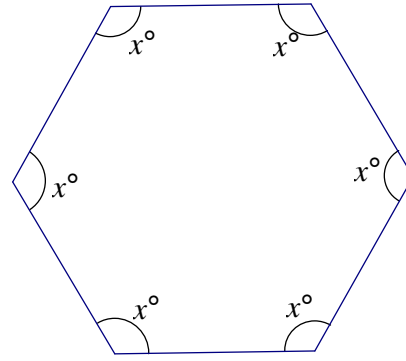Triangle A Triangle B Triangle C

34.

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

35. (a)   It is given that the slope of straight line L_1 is -4.   If a straight line L_2 is perpendicular to L_1, find the slope of L_2.

    (b)   It is given that the slope of straight line L_3 is -5.   If a straight line L_4 is parallel to L_3, find the slope of L_4.
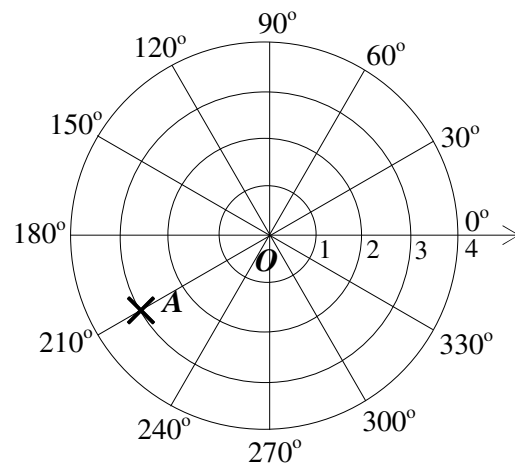
36. According to the figure, find the value of x.

37. 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 line *AE* and horizontal plane *ABCD*.
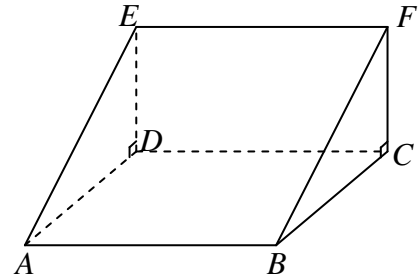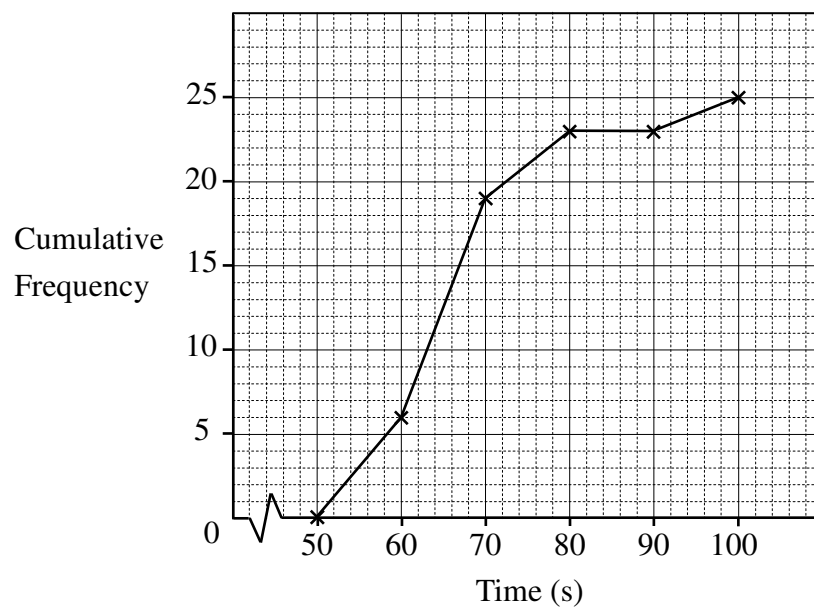

38. Find the polar coordinates of point *A* in the figure.

39. Two fair coins are tossed once. Find the probability of getting one head and one tail.

40. The following cumulative frequency polygon shows the 400 m race running times of 25 students:

How many students took more than 70 s to finish the race?

**SECTION C:** **All working must be clearly shown.**

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

41. The Student Council used 15% of school grant to buy a Table-tennis Table. The table costs $1200. Find the amount of school grant.

42. Ben deposited $4000 into a bank. The interest rate was 3% p.a., compounded yearly. Find the amount that Ben would receive after 3 years, correct to the nearest dollars.

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. The area of a circle is 256π cm^2.

   (a) Let the radius of the circle be r cm. Find the value of r.
   (b) Find the circumference of the circle. Express the answer in terms of π.
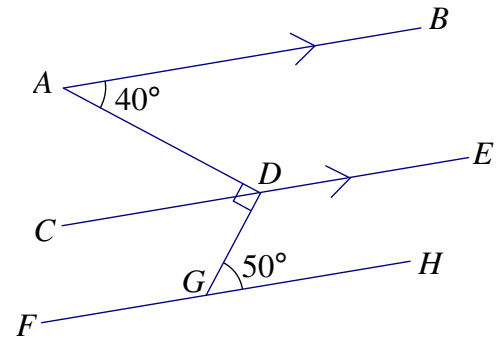
r cm
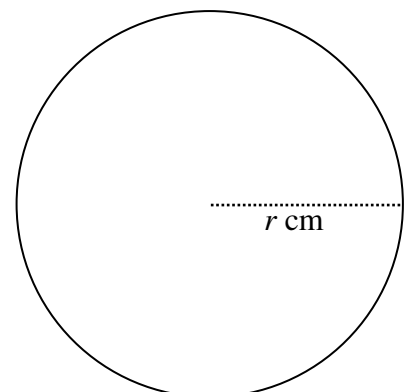
46. In the figure, the base of the right pyramid is a square of side length 8 cm. Its slant height is 5 cm.

Find the total surface area of the pyramid.

5 cm

8 cm

8 cm
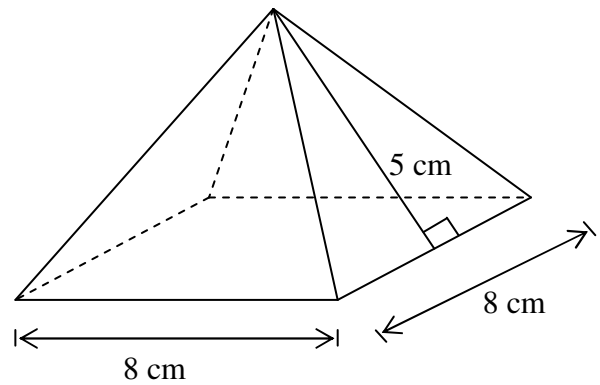
47. In the figure, *CDE* and *FGH* are straight lines, $AB \parallel CE$, $\angle BAD = 40°$, $\angle DGH = 50°$, $\angle ADG = 90°$.

Prove that $CE \parallel FH$.

48. Find the distance between the points $A(20, 7)$ and $B(-15, -5)$ in the rectangular coordinate plane.

49. The volunteering hours of 15 students are recorded as follows:

25	25	27
13	35	46
13	25	15
51	36	38
25	18	51

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

END OF PAPER