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Education Bureau
Territory-wide System Assessment 2024
Secondary 3 Mathematics
QUESTION BOOKLET

INSTRUCTIONS

1. There are 47 questions in this paper.
2. 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.

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 the prime factorisation of 54 ?

A. 6×9

B. $3^2 \times 6$

C. $1 \times 2 \times 3^3$

D. 2×3^3

2. Round off 40 780 to 2 significant figures.

A. 40 000

B. 40 700

C. 40 800

D. 41 000

3. $\sqrt[3]{729} =$

A. 3 .

B. 9 .

C. 27 .

D. 81 .

4. Mr Chan has x boxes of batteries. There are 50 batteries in each box. He used up 2 boxes and divided the rest of the batteries into 60 packs for selling. How many batteries are in each pack?

A. $\frac{50(x-2)}{60}$ batteries

B. $\frac{50x-2}{60}$ batteries

C. $\frac{x-2}{60}$ batteries

D. $\frac{x-50 \times 2}{60}$ batteries

5. Which of the following statements is correct ?

A. The solution of $2x+1=0$ is $\frac{1}{2}$.

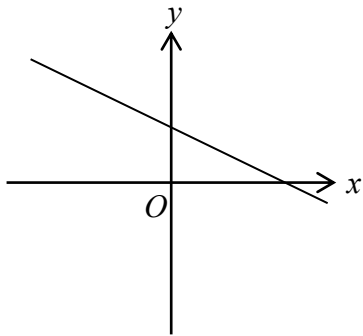
B. The solution of $x+\frac{1}{2}=0$ is $\frac{1}{2}$.

C. The solution of $2x-1=0$ is $\frac{1}{2}$.

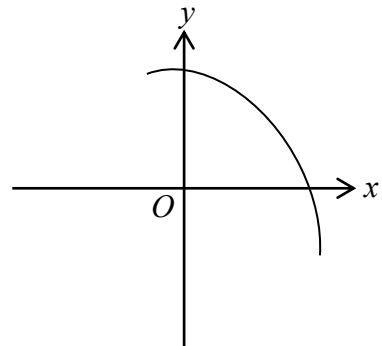
D. The solution of $-\frac{1}{2}-x=0$ is $\frac{1}{2}$.

6. Which of the following may represent the graph of the equation $x + 2y - 5 = 0$?

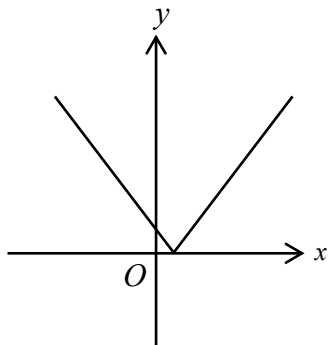
A.



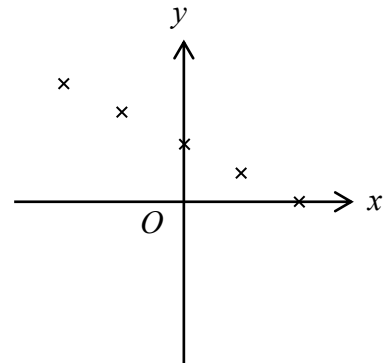
B.



C.



D.



7. $5^{-2} =$

A. $\frac{1}{25}$.

B. -25 .

C. $\frac{1}{10}$.

D. -10 .

8. Which of the following is **NOT** a polynomial ?

A. $13x + 2y$

B. $\frac{y}{13} + 2y^2$

C. $\frac{13}{y} + 2y$

D. $26xy^2$

9. The length of a rectangle is x cm . Its width is 15 cm . If the perimeter of the rectangle does not exceed 200 cm , which of the following inequalities can be used to find the range of the values of x ?

A. $2(x+15) < 200$

B. $2(x+15) > 200$

C. $2(x+15) \leq 200$

D. $2(x+15) \geq 200$

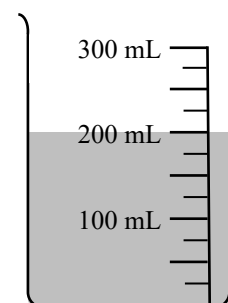
10. Garfield uses a beaker to measure the volume of a can of drink and the result is 200 mL . Find the percentage error of the measured value.

A. 4.17%

B. 6.25%

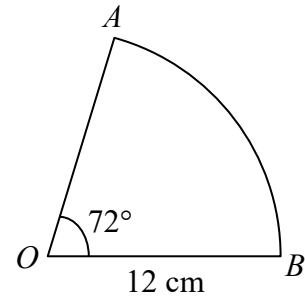
C. 12.5%

D. 66.7%

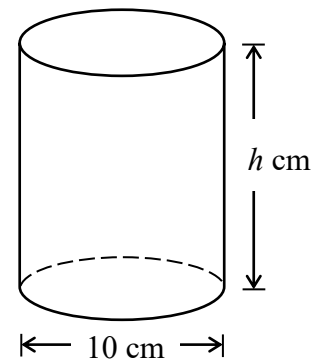
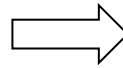


11. In the figure, the radius of sector OAB is 12 cm and $\angle AOB = 72^\circ$. Find the area of the sector. Give the answer correct to 3 significant figures.

- A. 7.54 cm^2
- B. 15.1 cm^2
- C. 90.5 cm^2
- D. 181 cm^2



12.

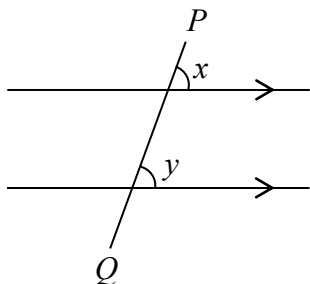


A piece of paper with an area of 200 cm^2 is folded into a hollow right circular cylinder without overlapping. The base diameter and the height of the cylinder are 10 cm and h cm respectively. Find the value of h . Give the answer correct to 3 significant figures.

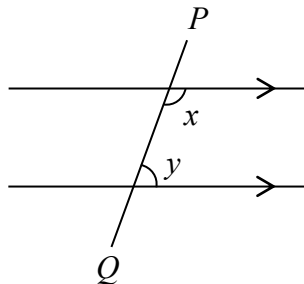
- A. 2.55
- B. 3.18
- C. 6.37
- D. 12.7

13. In each of the following figures, PQ is a straight line. Which figure shows that x and y are a pair of interior angles on the same side?

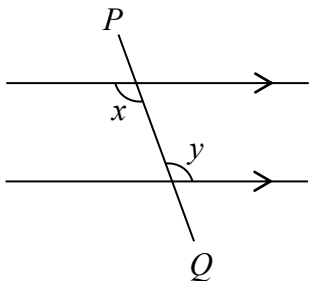
A.



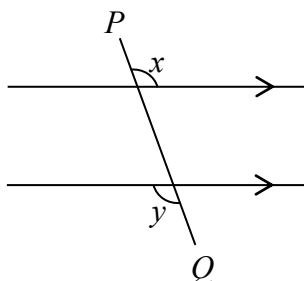
B.



C.

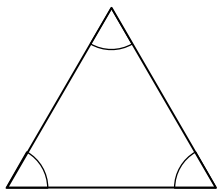


D.

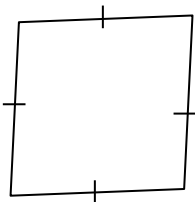


14. Which of the following **MAY NOT** be a regular polygon?

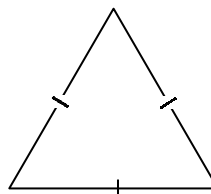
A.



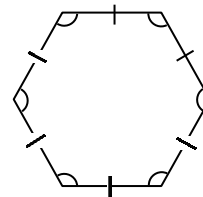
B.



C.

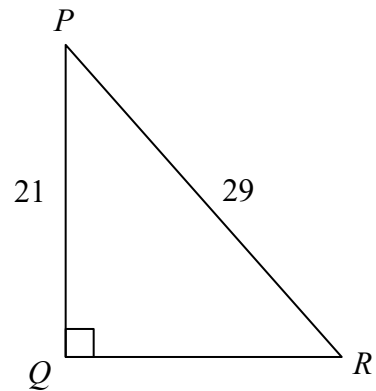


D.



15. In the figure, $\triangle PQR$ is a right-angled triangle. If $PQ = 21$ and $PR = 29$, find QR .

- A. $\sqrt{29^2 - 21^2}$
- B. $\sqrt{29^2 + 21^2}$
- C. $29^2 - 21^2$
- D. $29^2 + 21^2$



16. $P(-7, 4)$ and $Q(3, -8)$ are two points in the rectangular coordinate plane. The coordinates of the mid-point of PQ are

- A. $(-10, 12)$.
- B. $(-5, 6)$.
- C. $(-4, -4)$.
- D. $(-2, -2)$.

17. The slopes of three straight lines L_1 , L_2 and L_3 are listed in the table below.

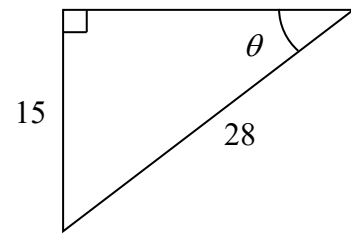
Line	L_1	L_2	L_3
Slope	$\frac{12}{13}$	$-\frac{12}{13}$	$\frac{13}{12}$

Which of the following is correct ?

- A. $L_1 \perp L_2$
- B. $L_1 \parallel L_3$
- C. $L_2 \parallel L_3$
- D. $L_2 \perp L_3$

18. Referring to the figure, find θ . Give the answer correct to 3 significant figures.

- A. 28.2°
- B. 32.4°
- C. 57.6°
- D. 61.8°



19. The table below shows the sale proportions of different types of set lunch sold in a school tuck shop on a day.

Type of set lunch	Proportion of total number of set lunches sold
A	20%
B	26%
C	19%
D	28%
E	7%

Which of the following is the most suitable for presenting the data above?

- A. Pie chart
- B. Histogram
- C. Stem-and-leaf diagram
- D. Cumulative frequency polygon

20. The following table shows the personal vaccination history and the corresponding frequency of people who reserved a booking at a vaccination clinic yesterday.

Vaccination history	Never vaccinated	Received 1 dose to 3 doses of vaccine	Received more than 3 doses of vaccine
Frequency	1	497	2

According to the table above, find the relative frequency of the people who received 1 dose or more of vaccine.

- A. $\frac{1}{500}$
- B. $\frac{2}{500}$
- C. $\frac{497}{500}$
- D. $\frac{499}{500}$

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

21. Calculate $200 \div [25 - (1 + 7 \times 2)]$.

22. Calculate $\frac{-1 - 2(-8)}{-3}$.

23. A restaurant sold 1 344 lunch sets today. It is 12% more than the number of lunch sets sold yesterday. Find the number of lunch sets sold by the restaurant yesterday.

24. In each of the following situations, determine whether the relationship between x and y is direct proportion or inverse proportion.

- (i) A bottle of soft drink is divided into x cups equally. Each cup has y mL .
- (ii) A ticket for a theme park is sold at \$200 . Wilson pays \$ y to buy x tickets.

25. A fruit shop sold 150 apples and mangoes in total, 70 of which were mangoes. Find the ratio of the number of apples to the number of mangoes sold.

26. The diameter of the pollen of a plant is about 0.000 04 m . Use scientific notation to represent the diameter.

27. Expand $(x + 2)(3x - 5)$.

28. Factorise $2x^2 + 7x + 3$.

29. Factorise $x^2 - 2x + 1$.

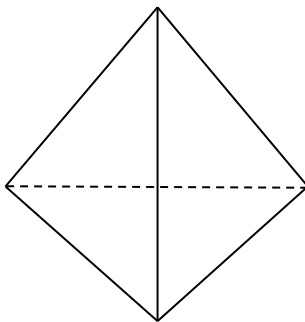
30. Consider the formula $a = \frac{f^2}{m+n}$. If $f = 5$, $m = 9$ and $n = 3$, find the value of a .

31. Solve the inequality $2x \leq -8$.

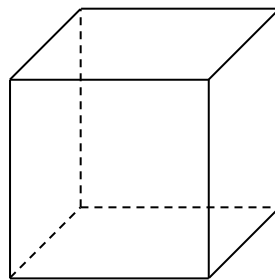
32. The figure shows Solids P , Q and R . If each surface of the solids is either a square or an equilateral triangle, which of the following solids can satisfy **ALL** descriptions below?
(May be more than one answer)

- I. It is a prism.
- II. It is a right solid.

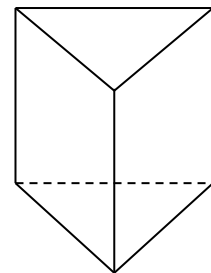
Solid P



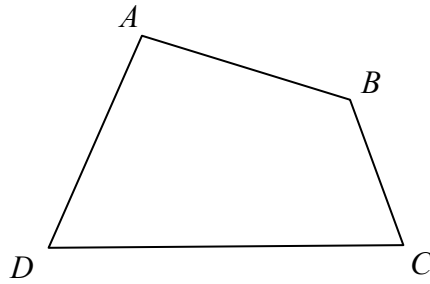
Solid Q



Solid R

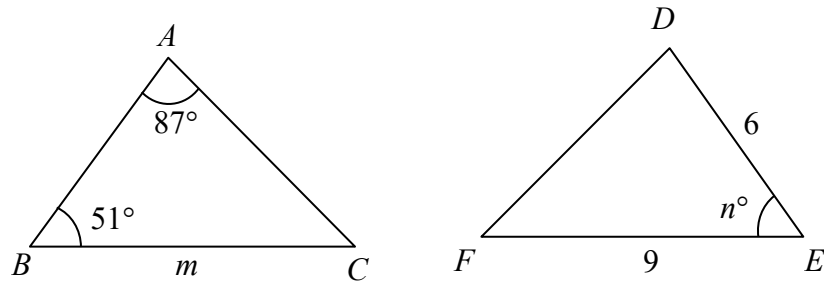


33. Use the given letters to represent the quadrilateral shown in the figure.

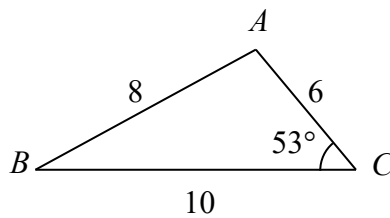


34. In the figure, $\triangle ABC \cong \triangle DEF$. Find

- (a) the value of m ,
- (b) the value of n .

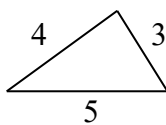


35.

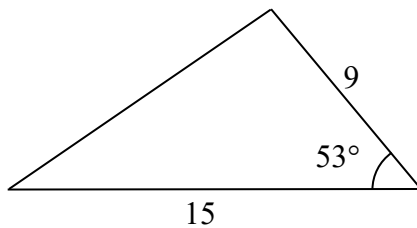


Which of the following triangles **MUST** be similar to $\triangle ABC$ as shown in the above figure?
(May be more than one answer)

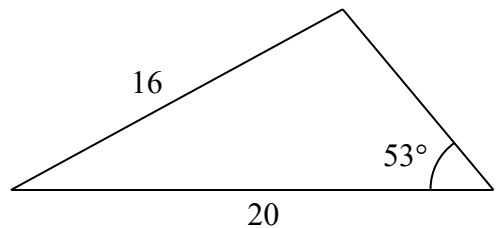
Triangle P



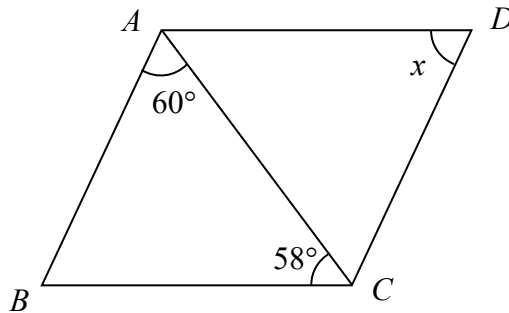
Triangle Q



Triangle R



36. In the figure, $ABCD$ is a parallelogram. It is given that AC is the diagonal, $\angle BCA = 58^\circ$ and $\angle BAC = 60^\circ$. Find x .



37. The stem-and-leaf diagram below shows the scores a basketball team got in each match last year.

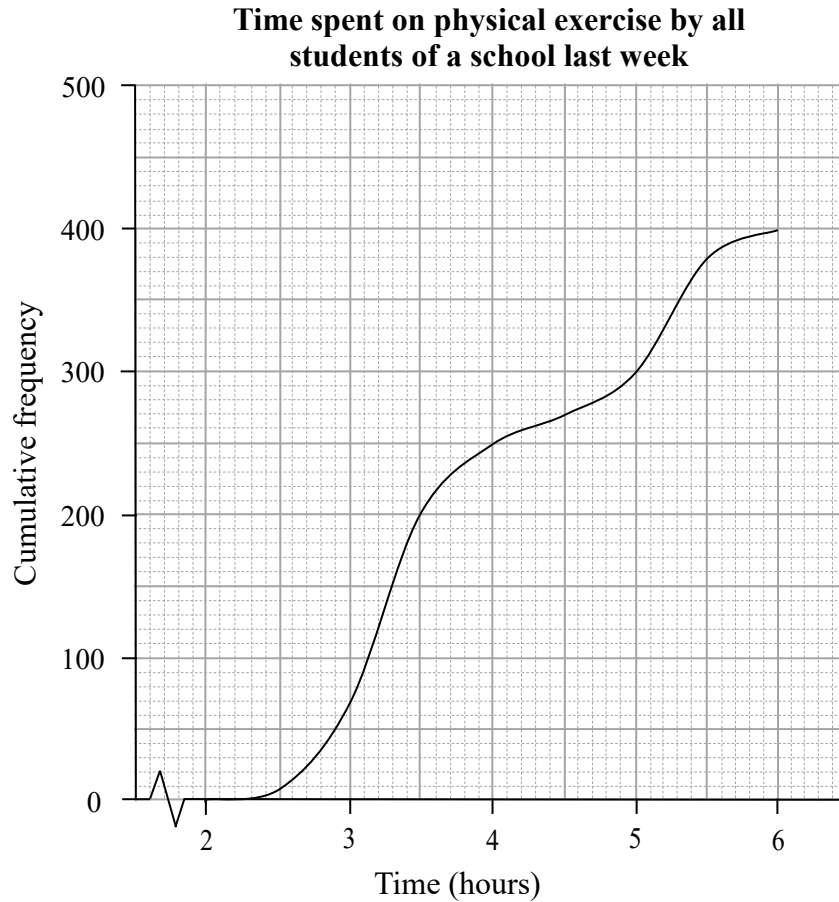
Scores of a basketball team got in each match last year

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

According to the above stem-and-leaf diagram, answer the following questions.

- How many matches did the basketball team play last year?
- What was the lowest score the basketball team got in the matches last year?
- Find the median score the basketball team got in the matches last year.

38. The cumulative frequency curve below shows the distribution of time spent on physical exercise by all students of a school last week.



According to the above diagram, answer the following questions.

- (a) How many students does the school have?
- (b) What was the number of students who spent less than 3 hours on physical exercise last week?
39. The following table shows the price indices and their corresponding weight of the four types of household expenditure (clothing, food, housing and transport) of a city in the previous year.

		Household expenditure			
		Clothing	Food	Housing	Transport
Price index		42	53	68	38
Weight		15%	30%	40%	15%

Find the weighted mean price index of these four types of household expenditure of the city in the previous year.

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. Peter deposits \$5 000 in a bank. After 4 years, he will receive **simple interest** of \$1 000. Find the annual interest rate.

41. Complete the table for the equation $y = \frac{3x-8}{4}$ in the **ANSWER BOOKLET**.

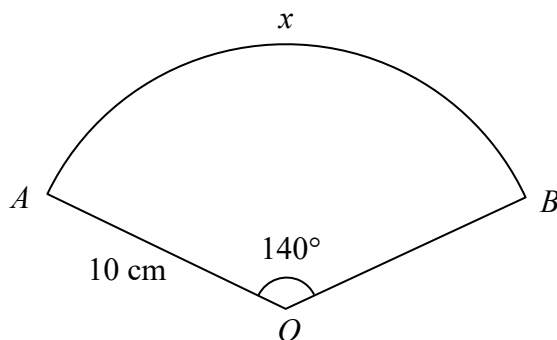
x	-4	0	4
y		-2	

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

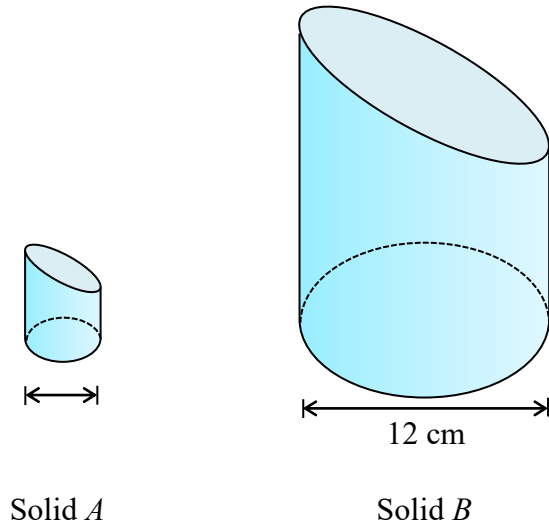
42. (a) Simplify $(x^5)^3$ and express the answer with positive index.

(b) Simplify $x^{-2}(x^5)^3$ and express the answer with positive index.

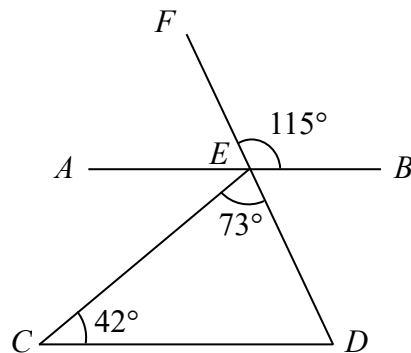
43. In the figure, the radius of sector OAB is 10 cm and $\angle AOB = 140^\circ$. Let x be the arc length of the sector, find x . Give the answer correct to 3 significant figures.



44. In the figure, Solid A and Solid B are similar and the total surface areas are 200 cm^2 and 1800 cm^2 respectively. Their bases are circles. The base diameter of Solid B is 12 cm . Find the base diameter of Solid A .



45. In the figure, AEB and FED are straight lines. It is given that $\angle ECD = 42^\circ$, $\angle CED = 73^\circ$ and $\angle FEB = 115^\circ$. Prove that $AB \parallel CD$.



46. The following frequency distribution table shows the recovery time of 35 patients suffering from influenza.

Recovery time (hours)	1 – 24	25 – 48	49 – 72	73 – 96	97 – 120	121 – 144	145 – 168
Frequency	1	4	9	11	5	3	2

- (a) According to the above table, complete the cumulative frequency distribution table in the **ANSWER BOOKLET**.
- (b) Construct a cumulative frequency polygon in the **ANSWER BOOKLET** to represent the above data.
47. The following shows the monthly electricity consumption (kWh) of a company last year.
- 4 300, 5 300, 5 800, 6 300, 6 600, 7 200, 7 300, 8 100, 9 100, 11 600, 11 700, 12 700

It is given that the mean of the monthly electricity consumption of the company last year was 8 000 kWh. Hence, the manager claimed, “Last year, over half of the monthly electricity consumptions were more than 8 000 kWh.”

Do you agree with the manager? Explain your answer.

END OF PAPER

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Answers written on this page will not be marked.

