

9	M	E	3	(Q)
----------	----------	----------	----------	----------	----------	----------

Education Bureau
Territory-wide System Assessment 2019
Secondary 3 Mathematics
QUESTION BOOKLET

INSTRUCTIONS

1. There are 47 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	$= 2\pi r h$
	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	$= \frac{1}{3} \times \text{base area} \times \text{height}$

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

1. Determine whether to estimate or to compute the exact value in each of the following situations.
- (i) A hospital recorded the number of new cases of lung cancer diagnosed last year.
- (ii) The Department of Health announced the total number of daily cigarette smokers in Hong Kong last year.

	(i)	(ii)
A.	To estimate	To compute the exact value
B.	To estimate	To estimate
C.	To compute the exact value	To compute the exact value
D.	To compute the exact value	To estimate

2. Determine whether a rate or a ratio should be used to relate the quantities in each of the following statements.

- (i) John finished a 200 m race in 30 s.
- (ii) John and Ray can successively skip 126 times and 134 times respectively.

	(i)	(ii)
A.	Ratio	Rate
B.	Ratio	Ratio
C.	Rate	Ratio
D.	Rate	Rate

3. The shopkeeper of a stationery store has x pencils. After discarding 2 broken pencils, the remaining pencils could all be put in boxes. If there are 6 pencils in each box, how many boxes of pencils are there?

- A. $\left(\frac{x-2}{6}\right)$ boxes
- B. $\left(\frac{x}{6}-2\right)$ boxes
- C. $(6x-2)$ boxes
- D. $6(x-2)$ boxes

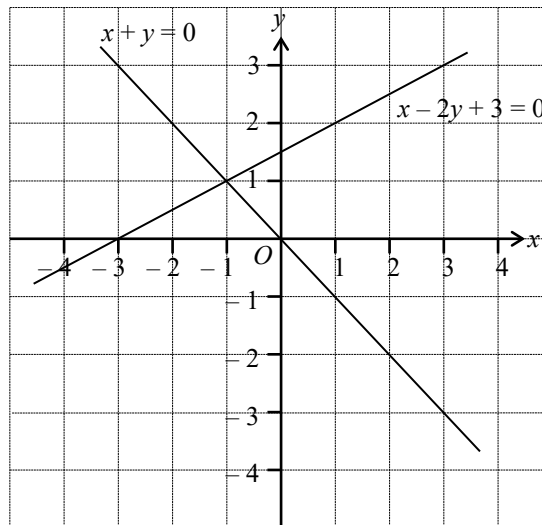
4. Find the degree of the polynomial $6y^7 + y^2 - y + 5$.

- A. 7
- B. 6
- C. 5
- D. 4

5. Which of the following points lies on the straight line $2x - y + 4 = 0$?

- A. $(-2, 1)$
- B. $(-1, 2)$
- C. $(0, 2)$
- D. $(2, 0)$

6.



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

According to the given graphs, solve the simultaneous equations $\begin{cases} x + y = 0 \\ x - 2y + 3 = 0 \end{cases}$ graphically.

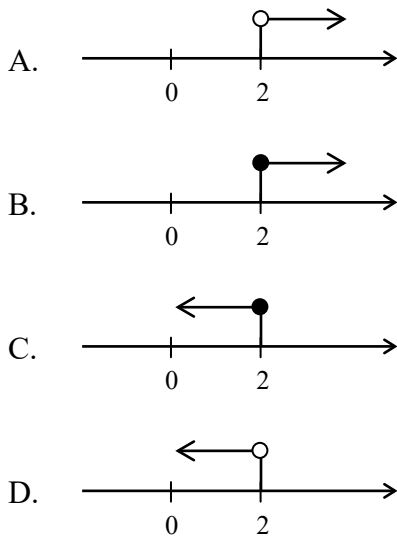
- A. $(0, 0)$
- B. $(-1, 1)$
- C. $(1, -1)$
- D. $(-3, 0)$

7. The price of a pair of sports shoes is $\$y$. The price of a jacket is $\frac{1}{3}$ that of a pair of sports shoes. Ryan spends $\$1\,400$ to buy two pairs of sports shoes and one jacket.

Which of the following equations can be used to find the value of y ?

- A. $y + 2(3y) = 1400$
- B. $2y + 3y = 1400$
- C. $y + 2\left(\frac{y}{3}\right) = 1400$
- D. $2y + \frac{y}{3} = 1400$

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

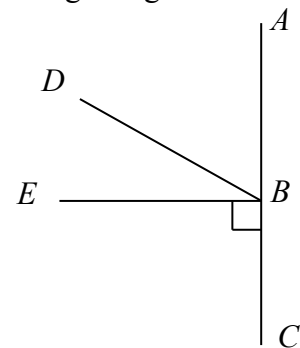


9. Mr Lam takes High Speed Rail from Hong Kong West Kowloon station to Guangzhounan station in 51 mins (correct to the nearest minute). Which of the following could be the actual time taking the rail?

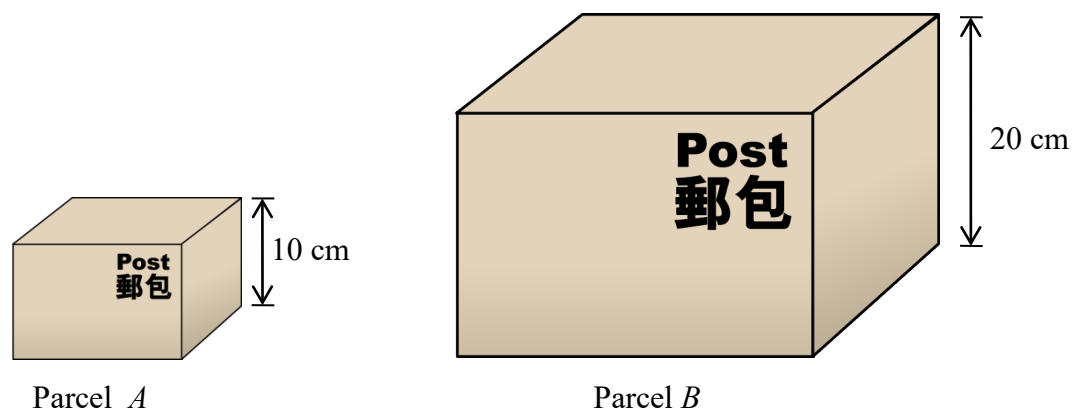
- A. 51.6 mins
- B. 51.5 mins
- C. 50.6 mins
- D. 50.4 mins

10. In the figure, ABC is a straight line. Which of the following is a straight angle?

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

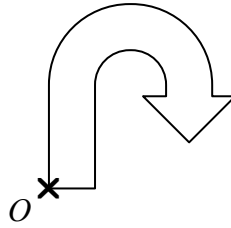


11. In the figure, Parcel A and Parcel B are similar solids. Their heights are 10 cm and 20 cm respectively. The volume of Parcel A is $1\,200\text{ cm}^3$. Find the volume of Parcel B .



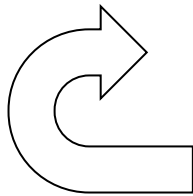
- A. $2\,400\text{ cm}^3$
- B. $4\,800\text{ cm}^3$
- C. $7\,200\text{ cm}^3$
- D. $9\,600\text{ cm}^3$

12.

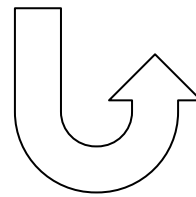


Find the image of the above figure after rotating about O through 90° in an anticlockwise direction.

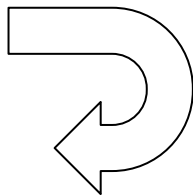
A.



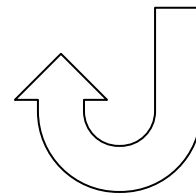
B.



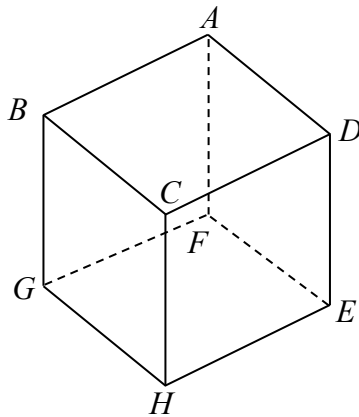
C.



D.



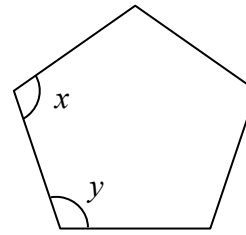
13. The figure shows a cube $ABCDEFGH$. Which of the following is a plane of reflectional symmetry of the cube?



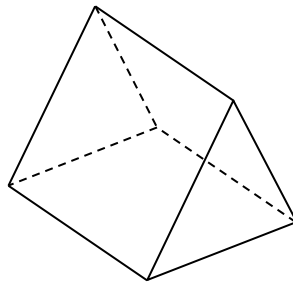
- A. $ABCD$
- B. $ADHG$
- C. $BCHG$
- D. $EFGH$

14. In the figure, x and y are

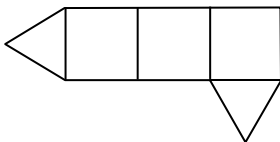
- A. exterior angles of the pentagon.
- B. interior angles of the pentagon.
- C. corresponding angles.
- D. adjacent angles.



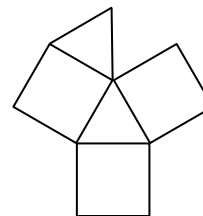
15. Which of the following nets can be folded into a right prism with equilateral triangles as bases?



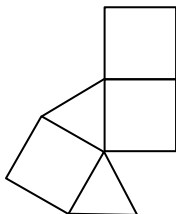
A.



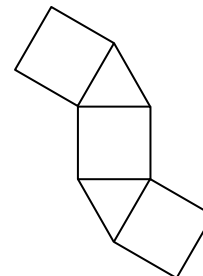
B.



C.

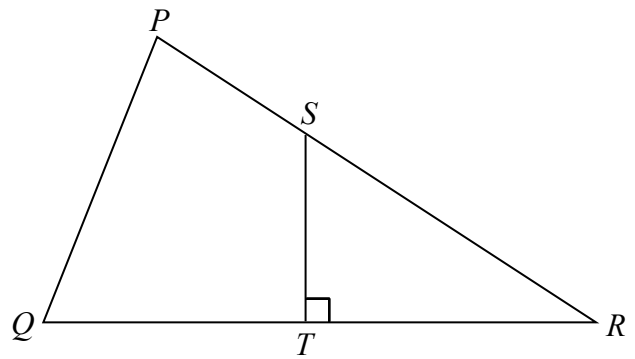


D.



16. In $\triangle PQR$, $QT = TR$ and $ST \perp QR$. ST **MUST** be

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

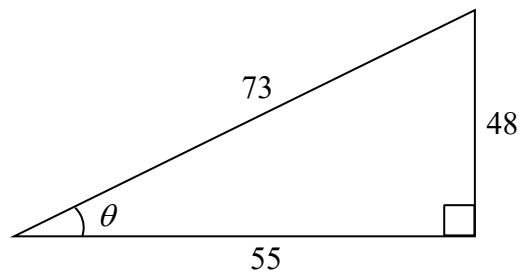


17. $A(-2, 5)$ and $B(4, -17)$ are two points in the rectangular coordinate plane. The coordinates of the mid-point of AB are

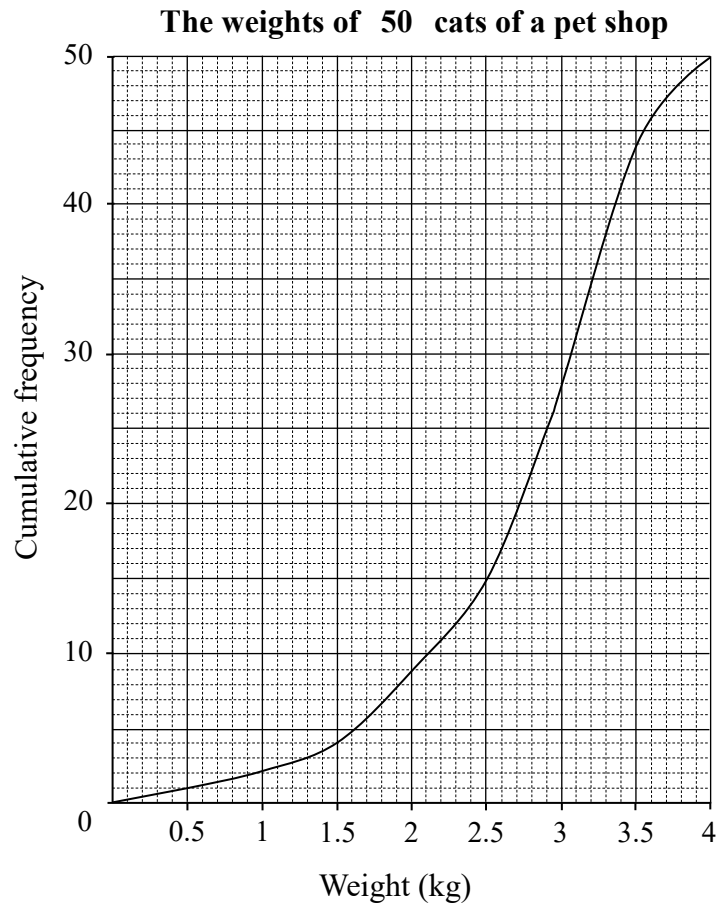
- A. $(-2-4, 5-(-17))$.
- B. $(-2+4, 5+(-17))$.
- C. $\left(\frac{-2-4}{2}, \frac{5-(-17)}{2}\right)$.
- D. $\left(\frac{-2+4}{2}, \frac{5+(-17)}{2}\right)$.

18. Find the value of $\cos \theta$ in the figure.

- A. $\frac{48}{55}$
- B. $\frac{48}{73}$
- C. $\frac{55}{73}$
- D. $\frac{73}{55}$



19. The cumulative frequency curve below shows the weights (kg) of 50 cats of a pet shop.



Find the median of the weights of the 50 cats.

- A. 2 kg
 - B. 2.9 kg
 - C. 9 kg
 - D. 25 kg
20. A library officer wants to know which type of books has been borrowed most frequently. Which of the following is the most suitable method to collect data?
- A. Study the past records of books being borrowed.
 - B. Record the number of people borrowing books in one day.
 - C. Hold an election for “My favorite book” .
 - D. Conduct a survey using questionnaires on the number of visits in the district of the library.

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

21. Directed numbers are used to represent the remaining stored value and the overdraft on an Octopus card.

For example,

-20 dollars represents that the overdraft is 20 dollars.

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

(i) The remaining stored value on Mary's Octopus card is 70 dollars.

(ii) The overdraft on John's Octopus card is 3 dollars.

22. Round off 18.2076 to 2 decimal places.

23. How many positive integers are less than $\sqrt{142}$?

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

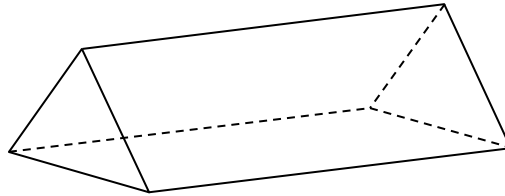
29, 22, 15, 8, x , y , ...

25. Expand $y(3y - 2)$.

26. Expand $(7 - y)^2$.

27. Factorize $x^2 + 13x + 12$.

28. The figure shows the diagram of a triangular prism:



Referring to the sketch shown above, add 2 solid lines and 1 dotted line in the figure provided in the **ANSWER BOOKLET** so as to form a diagram of a **cuboid**.

29. Consider the formula $s = \frac{t^2}{2+w}$. If $t = 5$ and $w = -3$, find the value of s .

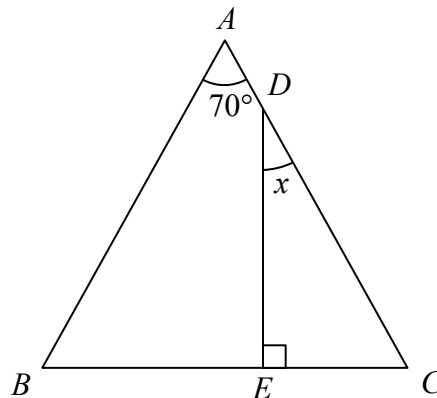
30. In the **ANSWER BOOKLET**, fill in the box with $>$ or $<$ to express the relation between the numbers.

$$\frac{4}{21}$$

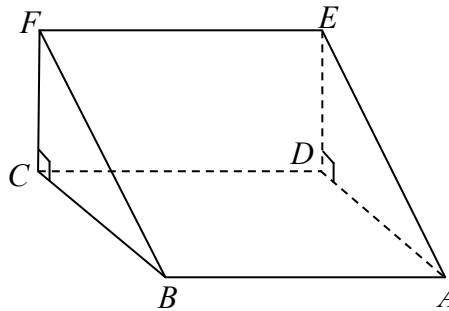


$$\frac{5}{19}$$

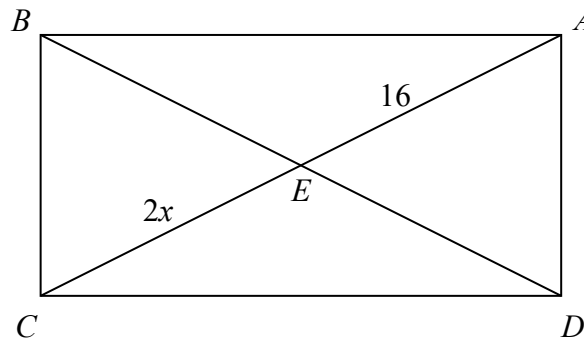
31. In the figure, BEC and ADC are straight lines. $AB = AC$, $\angle BAC = 70^\circ$ and $\angle DEC = 90^\circ$. Find x .



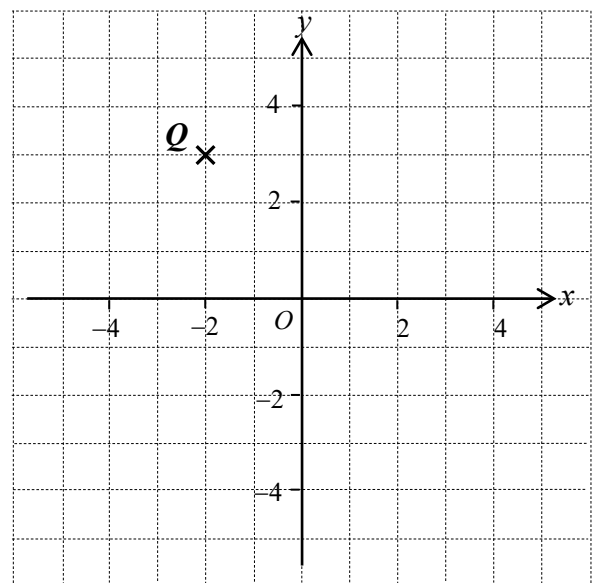
32. The figure shows a triangular prism. $ABCD$, $CFED$ and $ABFE$ are rectangles. $ABCD$ is a horizontal plane and $CFED$ is a vertical plane. Name the angle between the plane $ABFE$ and the vertical plane $CFED$.



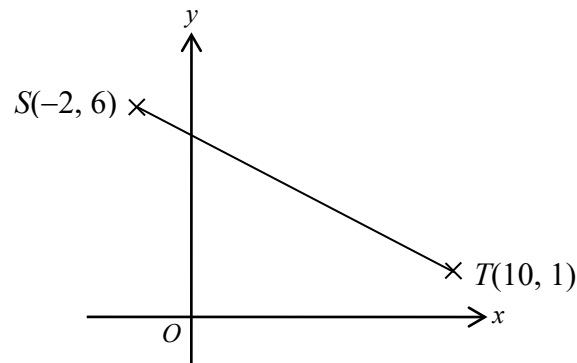
33. In the figure, $ABCD$ is a rectangle. E is the point of intersection of the diagonals AC and BD . Find the value of x .



34. Find the coordinates of point Q in the figure.



35. Find the distance between two points $S(-2, 6)$ and $T(10, 1)$ in the rectangular coordinate plane.



36. A university is doing a survey on the eating habits of Hong Kong residents. The survey is conducted in the following four stages.

- (1) According to the organised data, construct suitable statistical charts.
- (2) Interview Hong Kong residents on their eating habits by phone randomly.
- (3) Analyse the data and the statistical charts to draw conclusions.
- (4) Organise the data obtained from the phone interviews.

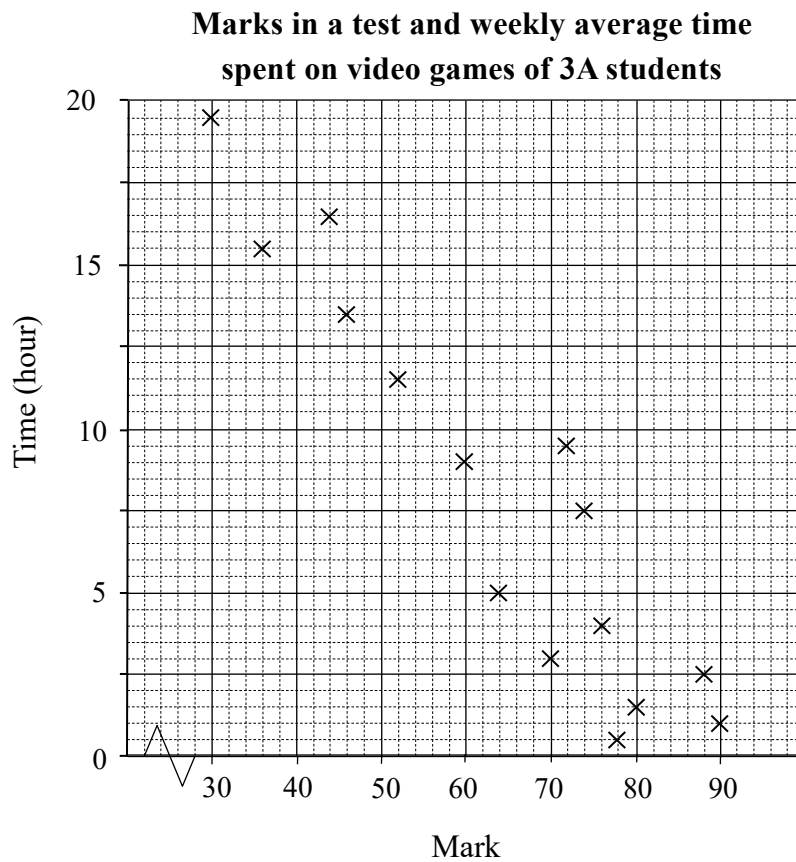
Arrange these stages in correct order. For example: (1) \rightarrow (2) \rightarrow (3) \rightarrow (4)

37. Kitty participates in a Korean language test. The following table shows the weight of each marking item and her marks in these items.

	Marking item			
	Pronunciation	Use of Language	Fluency	Presentation Skill
Mark	80	74	66	72
Weight	4	3	2	1

Find the weighted mean mark of Kitty.

38. The scatter diagram below shows the marks in a test and weekly average time (hour) spent on video games of 3A students. The marks of all students in the test are different.



According to the above scatter diagram, answer the following questions.

- How many students are there in 3A?
 - Find the number of hours spent on video games per week on average of the student getting the highest mark in the test.
 - How many students spend more than 10 hours on video games per week on average?
39. An organization interviewed 100 fresh graduates from primary schools. The table below shows the distribution that these students entered a secondary school in their first three choices.

Choice	First	Second	Third
Number of students	67	30	3

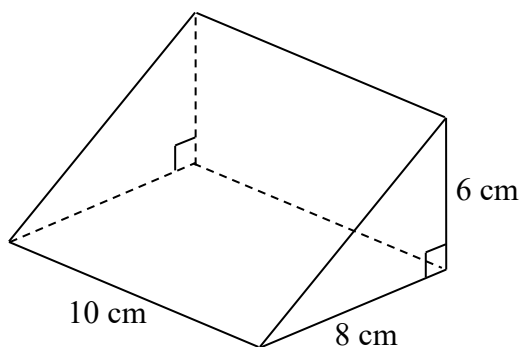
Find the empirical probability of entering a secondary school in their first choice.

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. Morris deposits \$4 000 in a bank. After 2 years, he will receive a **simple interest** of \$240. Find the annual interest rate.

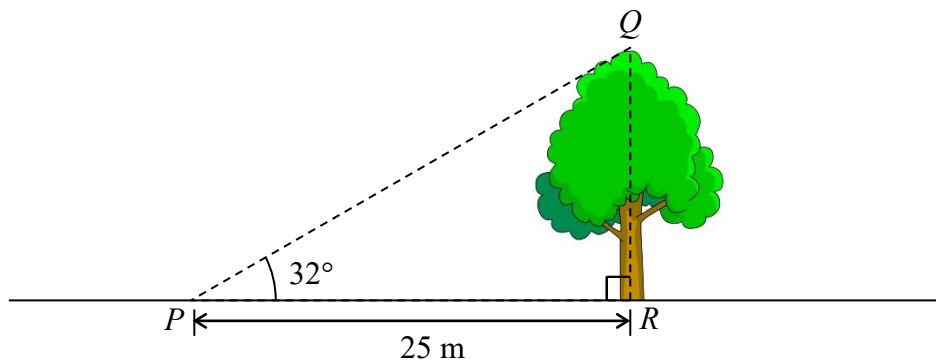
41. The figure shows a right triangular prism. Its base is a right-angled triangle. Find the volume of the prism.



42. In the figure, Thomas is standing at point P . The horizontal distance between Thomas and a tree QR is 25 m .

The angle of elevation of the top Q of the tree from point P is 32° .

Find the height of the tree QR . (Correct to 3 significant figures)



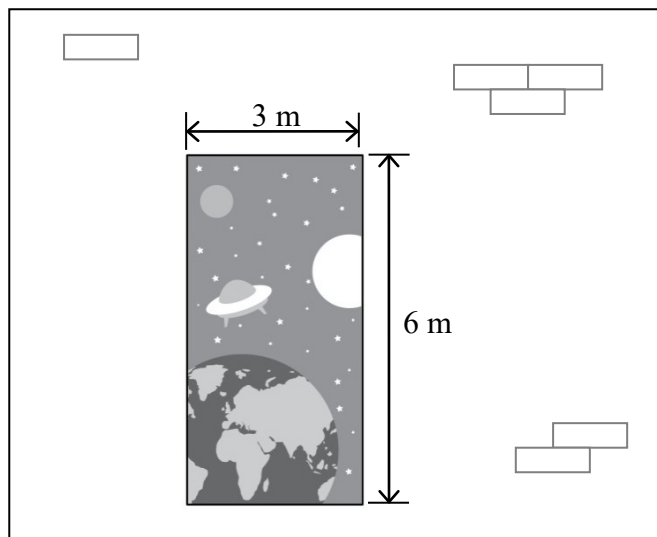
43. Fred exchanges 360 British pounds in a bank for Hong Kong dollars. The exchange rate is 1 British pound to 11 Hong Kong dollars. Find the amount in Hong Kong dollars he should receive.

44. Complete the table for the equation $x - 2y - 1 = 0$ in the **ANSWER BOOKLET**.

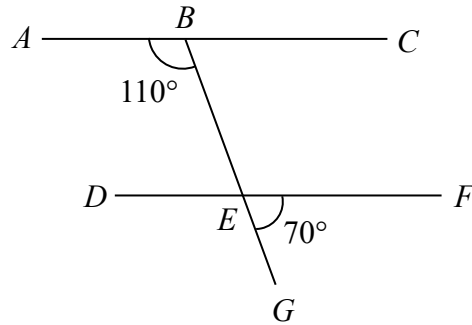
x	-3	1	3
y	-2		

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

45. In the figure, a giant poster is hanging on a wall. The length and width of the poster are 6 m and 3 m respectively. Estimate the area of the wall and explain your estimation method.



46. In the figure, ABC , DEF and BEG are straight lines. $\angle ABE = 110^\circ$ and $\angle FEG = 70^\circ$. Prove that $AC \parallel DF$.



47. The table below shows the weights of 30 customers of a fitness centre.

Weight (kg)	46 – 50	51 – 55	56 – 60	61 – 65
Frequency	5	13	10	2

- (a) According to the above table, complete the frequency distribution table in the **ANSWER BOOKLET**.
- (b) Find the mean weight of the 30 customers.

END OF PAPER

Do not write on this page.

Answers written on this page will not be marked.

