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Education Bureau
Territory-wide System Assessment 2014
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. 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	$= 2\pi rh$
	Volume	$= \pi r^2 h$
Cone	Curved surface area	$= \pi rl$
	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. Round off 0.004 596 to 3 significant figures.
 - A. 0.00
 - B. 0.005
 - C. 0.004 6
 - D. 0.004 60

2. Determine whether a rate or a ratio should be used to relate the two underlined quantities in each of the following statements.
 - (i) 130 and 124 citizens gave blood in the donor centres respectively over the past two days.
 - (ii) A printing machine can print 4 000 copies of newspapers in 4 hours.

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

3. The weight of Toby is 60 kg. Richard is heavier than Toby by x kg. If the total weight of them is 140 kg, which of the following equations can be used to find the value of x ?
 - A. $60 + (60 + x) = 140$
 - B. $60 + (60 - x) = 140$
 - C. $60 + x = 140$
 - D. $60 - x = 140$

4. Simplify $(3x^2 - 2x) - x$.
 - A. 0
 - B. $x^2 - x$
 - C. $3x^2 - 3x$
 - D. $-3x^3 + 2x^2$

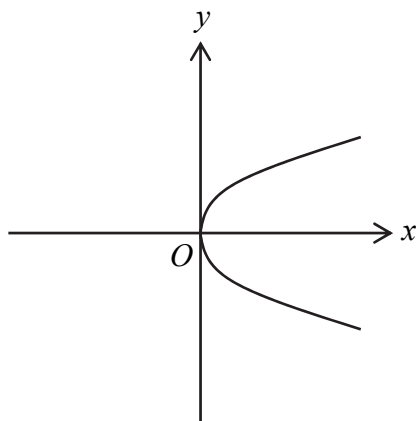
5. Determine whether each of the following is factorization or expansion.

(i)	$x^2 + 7x + 12$ $= (x + 3)(x + 4)$
(ii)	$(x + 1)(x - 2)$ $= x^2 - x - 2$

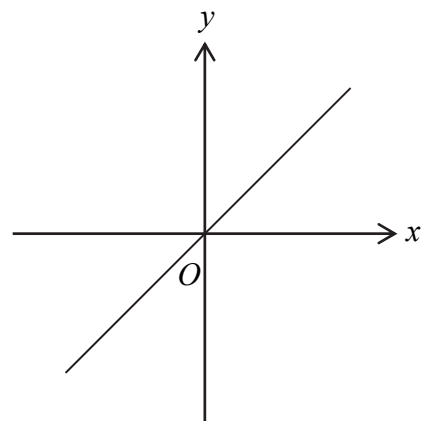
- A. (i) Factorization (ii) Expansion
 B. (i) Expansion (ii) Factorization
 C. (i) Factorization (ii) Factorization
 D. (i) Expansion (ii) Expansion

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

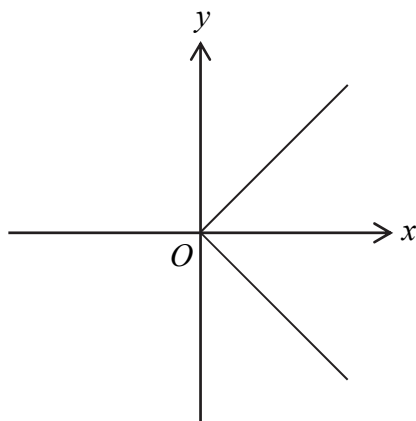
A.



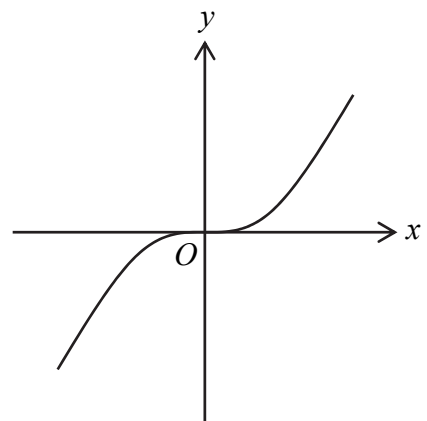
B.



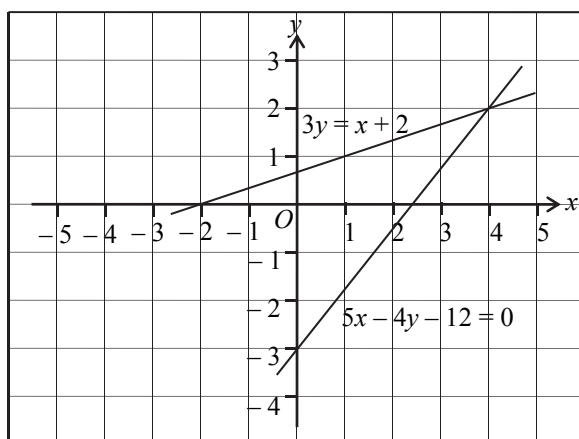
C.



D.



7.



The above figure shows the graphs of $3y = x + 2$ and $5x - 4y - 12 = 0$.

Solve the simultaneous equations $\begin{cases} 3y = x + 2 \\ 5x - 4y - 12 = 0 \end{cases}$ graphically.

- A. $(2, 4)$
- B. $(4, 2)$
- C. $(0, -3)$
- D. $(-2, 0)$

8. If $x \geq y$, which of the following inequalities **MUST** be correct?

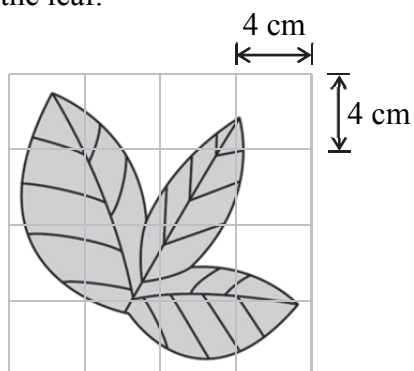
- A. $x + 4 \geq y + 4$
- B. $-4x \geq -4y$
- C. $4x \leq 4y$
- D. $x - 4 \leq y - 4$

9.



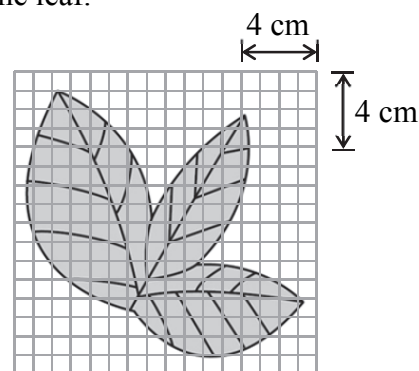
The above figure shows a leaf. Sandy wants to find its area. Which of the following methods is the best?

A. Sandy uses Graph Paper *P* to measure the area of the leaf.



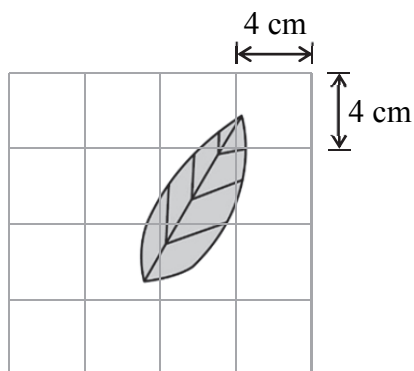
Graph Paper *P*

B. Sandy uses Graph Paper *Q* to measure the area of the leaf.



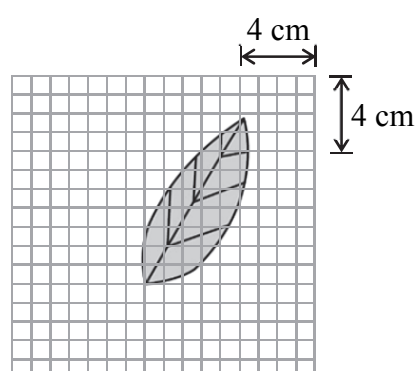
Graph Paper *Q*

C. Sandy cuts the leaf into 3 parts. She uses Graph Paper *P* to measure the area of one part and then multiply this area by 3.



Graph Paper *P*

D. Sandy cuts the leaf into 3 parts. She uses Graph Paper *Q* to measure the area of one part and then multiply this area by 3.



Graph Paper *Q*

10. During Sports Day, Percy needs to measure the distance jumped by his classmates in the long jump event. Which of the following tools measures the distance with the smallest error?

A. Pencil



B. Ruler



C. Tape measure

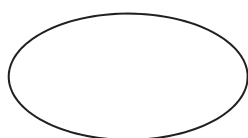


D. Palm

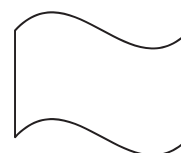


11. Which of the following is a polygon?

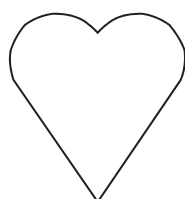
A.



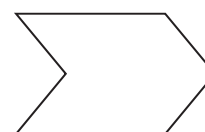
B.



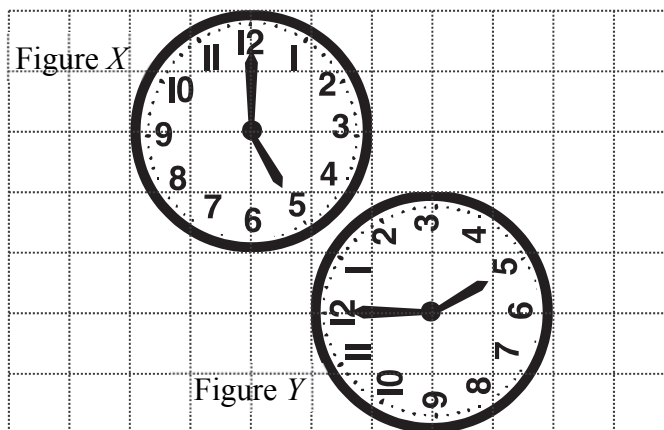
C.



D.

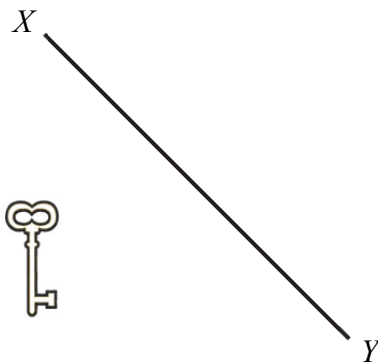


12. Figure X is changed to Figure Y after a single transformation. What is the corresponding transformation?



- A. Reflection
- B. Rotation
- C. Enlargement
- D. Translation

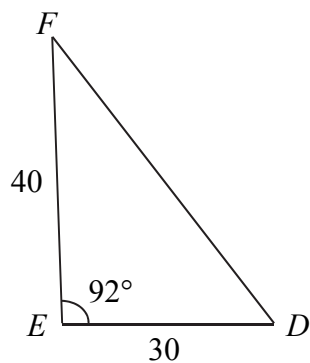
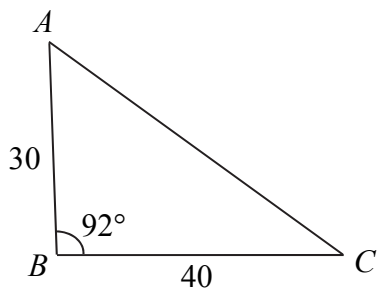
13.



Find the image of the above key after reflecting along the line XY .

- A.
- B.
- C.
- D.

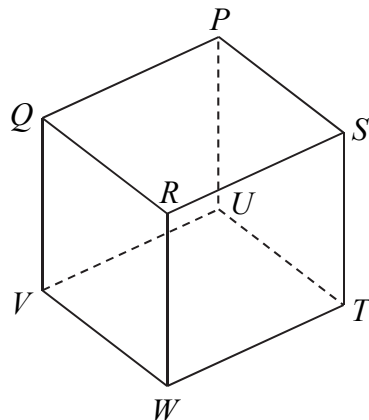
14.



According to the figures above, which of the following is correct?

- A. $\triangle ABC \cong \triangle FED$ (Ratio of 2 sides, included angle)
- B. $\triangle ABC \cong \triangle FED$ (AAA)
- C. $\triangle ABC \cong \triangle DEF$ (SAS)
- D. $\triangle ABC \cong \triangle DEF$ (RHS)

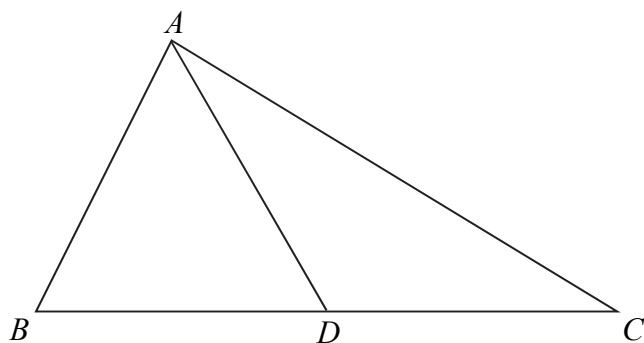
15. The figure shows a cube $PQRSTUVW$. Which of the following is an axis of rotational symmetry of the cube?



- A. WT
- B. ST
- C. PT
- D. QT

16. In $\triangle ABC$, $BD = DC$. AD **MUST** be

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

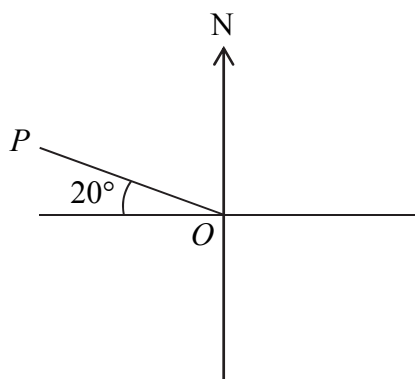


17. $A(4, 1)$ and $B(2, -3)$ are two points in a rectangular coordinate plane. The mid-point of AB is

- A. $(1, 2)$.
- B. $(2, 4)$.
- C. $(3, -1)$.
- D. $(6, -2)$.

18. Refer to the figure, find the bearing of P from O .

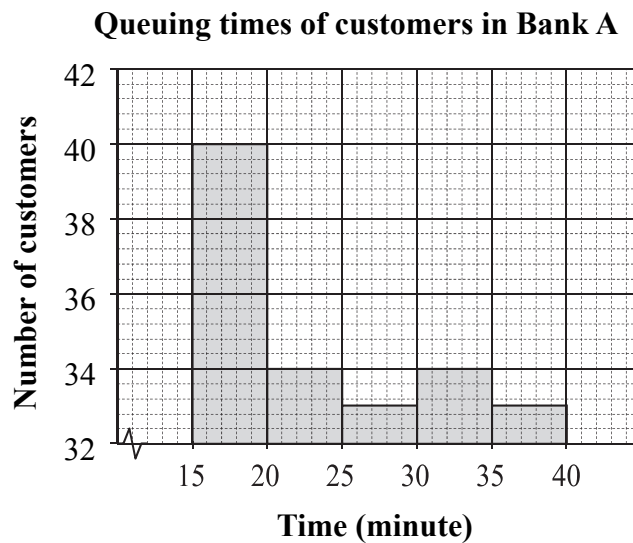
- A. 020°
- B. 070°
- C. 110°
- D. 290°



19. Mr Lam wants to study the amount of heavy metal found in three kinds of fishes. Which of the following is the most suitable method?

- A. Carry out experiments on these three kinds of fishes.
- B. Collect opinions of customers in restaurants through questionnaires.
- C. Interview citizens randomly by phone.
- D. Observe the selling of these three kinds of fishes in markets.

20. The diagram below shows the queuing times of customers in Bank A on one day.



Based on the diagram above, Karen believes that the queuing times of more than half of the customers are between 15 minutes and 20 minutes on that day.

Which of the following statements is the best reason that Karen is misled by the above diagram?

- A. The unit used for the horizontal axis is not in hour.
- B. The vertical scale does not start from 0.
- C. The date for collecting the data is not indicated.
- D. The queuing times of the customers in other banks are not compared.

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

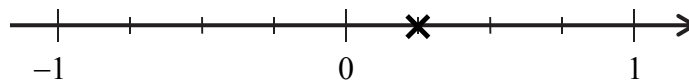
21. Joey uses directed numbers to represent the changes of the weights of her family members.
For example, +2 kg represents an increase of 2 kg in body weight.

Use directed numbers (positive numbers, negative numbers or zero) to represent the following situations:

- (i) The weight of father is unchanged.
- (ii) The weight of mother has decreased by 4 kg.

22. Calculate $\frac{6(-3)}{-3+6}$.

23. Use the symbol '×' to mark the number $\frac{5}{8}$ on the number line given in the **ANSWER BOOKLET**. Example: $\frac{1}{4}$ is marked on the number line below.



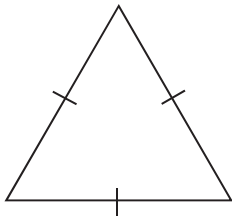
24. A machine can produce 18 bottles of sauce in one minute. How many bottles of sauce can be produced by the machine in one hour?
25. Find the coefficient of y^6 in the polynomial $3y^4 - 5y^6$.
26. Simplify $(3h - 4k) + (2h + 7k)$.
27. Expand $(x + 1)(2x + 1)$.
28. Factorize $x^2 - 4x - 5$.
29. Expand $(3y - 1)(3y + 1)$.

30. Make D the subject of the formula $C = 2D + 9$.

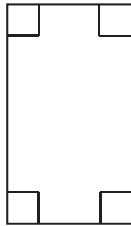
31. Solve the inequality $3x - 13 < 5$.

32. Which of the following polygons **MUST** be regular? (May be more than one answer)

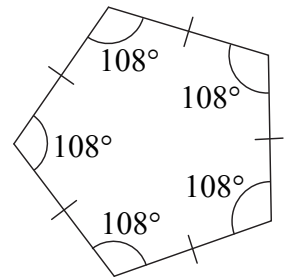
P.



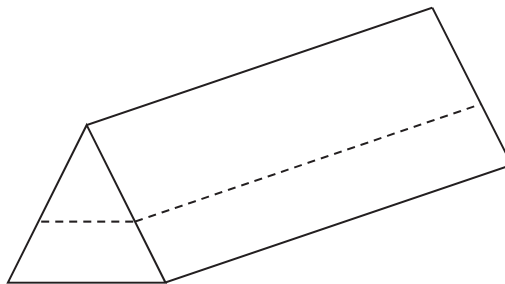
Q.



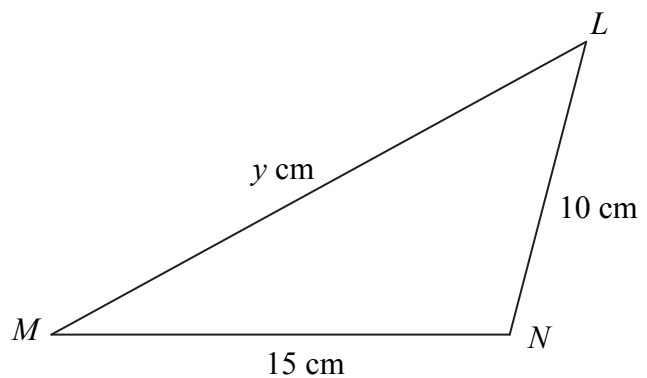
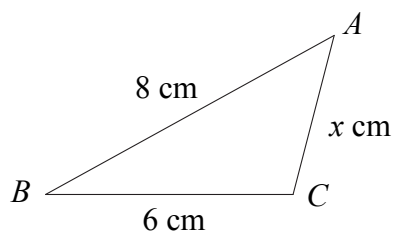
R.



33. A right prism is placed horizontally as shown. Sketch the cross-section of the prism in the **ANSWER BOOKLET** if it is cut horizontally along the dotted line.



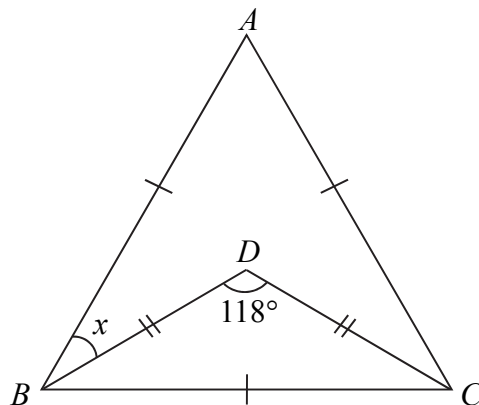
34.



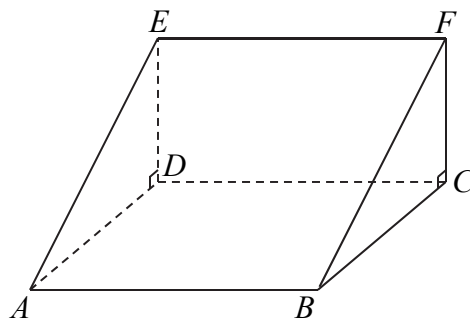
In the figure, $\triangle ABC \sim \triangle LMN$. Find

- (a) the value of x ,
- (b) the value of y .

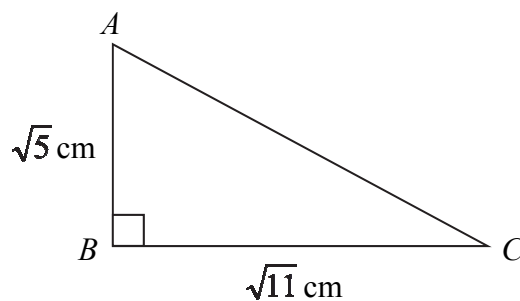
35. In the figure, $\triangle ABC$ is an equilateral triangle, $DB = DC$ and $\angle BDC = 118^\circ$. Find x .



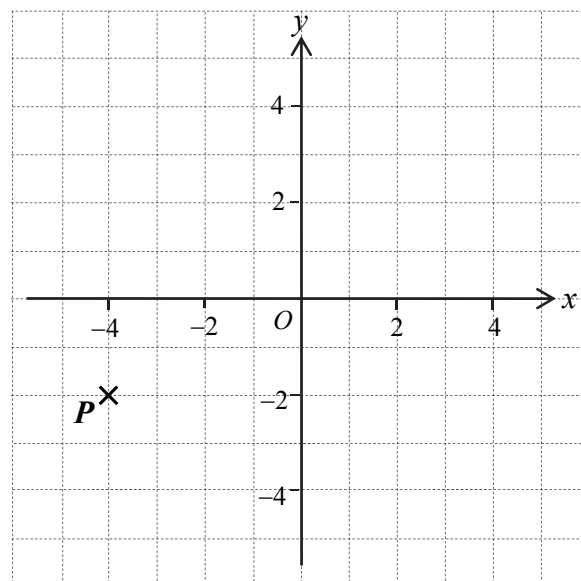
36. The figure shows a triangular prism. $ABCD$ and $CFED$ are rectangles. Name the angle between the plane $ABFE$ and the horizontal plane $ABCD$.



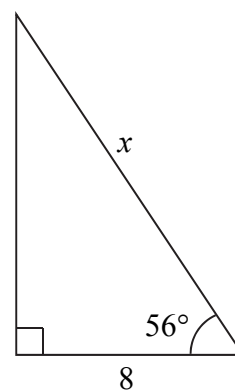
37. In the figure, $\angle ABC = 90^\circ$, $AB = \sqrt{5}$ cm and $BC = \sqrt{11}$ cm. Find the length of AC .



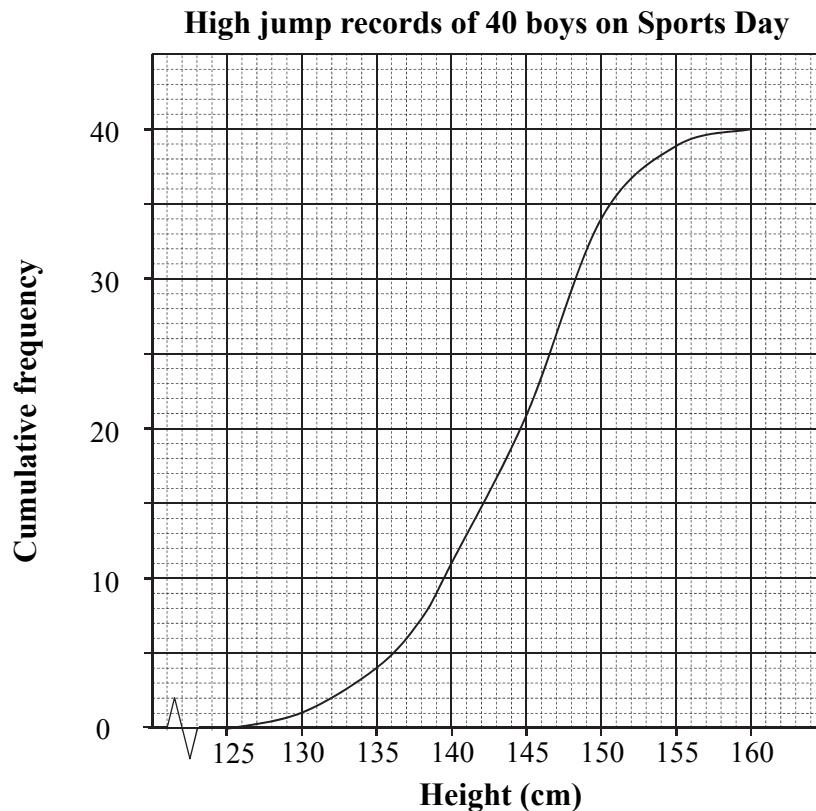
38. Find the coordinates of point P in the figure.



39. Find the value of x in the figure. (Correct to 3 significant figures)



40. The following cumulative frequency curve shows the high jump records of 40 boys on Sports Day.



If the record of a boy is 150 cm or higher, he is qualified to join the school's athletic team. Find the number of qualified boys.

41. Tony wants to find the empirical probability of his schoolmates not having smartphones. He randomly interviewed 100 schoolmates. The results are as follows:

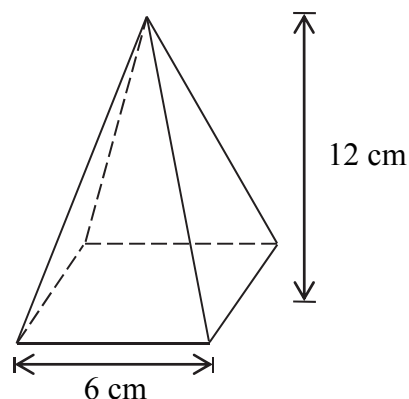
Number of smartphones	0	1	2 or more
Number of schoolmates	7	79	14

Find the empirical probability of his schoolmates **NOT** having smartphones.

SECTION C: All working must be clearly shown.

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

42. A guitar is sold for \$1 200 at a loss of \$300. Find the **cost price** and the **loss per cent** of the guitar.
43. Mandy deposits \$3 500 in a bank at a simple interest rate of 3% p.a. Find the **interest** and the **amount** she will receive after 4 years.
44. Scott bought a crystal for \$700 two years ago. Its value is increased by 10% each year. Find the present value of the crystal.
45. The height of the pyramid in the figure is 12 cm. Its base is a square of side 6 cm. Find the volume of the pyramid.



46. Complete the table for the equation $x + 2y - 2 = 0$ in the ANSWER BOOKLET.

x		2	
y	3	0	-1

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

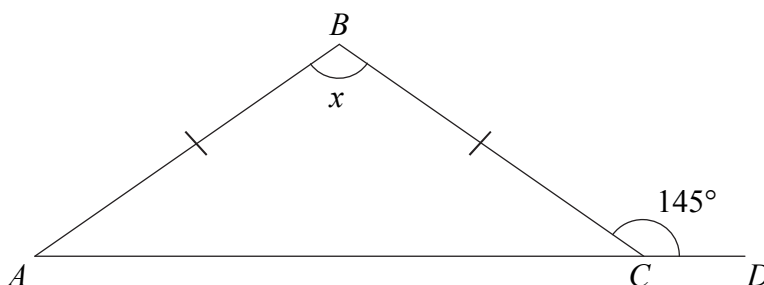
47. The following are the marks of Michael in the past 5 mathematics tests (the full mark of each test is 100):

100, 100, 30, 50, 20

It is given that the mode of the marks is 100. Hence Michael said to his mother, 'I got full marks in more than half of the 5 tests.'

Is Michael's saying misleading? Explain your answer.

48. In the figure, ACD is a straight line. $BA = BC$ and $\angle BCD = 145^\circ$. Find x .



49. The table below shows the heights of 50 Secondary One students.

Height (cm)	140 – 144	145 – 149	150 – 154	155 – 159
Frequency	14	24	8	4

Find the mean height of the 50 Secondary One students.

END OF PAPER

Do not write on this page.

Answers written on this page will not be marked.

