

<b>9</b>	<b>M</b>	<b>E</b>	<b>2</b>	<b>(</b>	<b>Q</b>	<b>)</b>
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**Education Bureau**  
**Territory-wide System Assessment 2017**  
**Secondary 3 Mathematics**  
**QUESTION BOOKLET**

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**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. An alloy weighs 2 095 g and it is made of two metals, copper and tin. The alloy is composed of 78% copper and 22% tin by weight. Which of the following expressions and results obtained can estimate reasonably the weight of copper in the alloy?

- A.  $3\,000\text{ g} \times 0.8 = 2\,400\text{ g}$
- B.  $3\,000\text{ g} \times 0.2 = 600\text{ g}$
- C.  $2\,000\text{ g} \times 0.8 = 1\,600\text{ g}$
- D.  $2\,000\text{ g} \times 0.2 = 400\text{ g}$

2.  $3.59 \times 10^4 =$

- A. 35 900.
- B. 3 590 000.
- C. 0.035 9.
- D. 0.000 359.

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

- (i) The price of 100 g of beef is \$14.2.
- (ii) The weights of Simon and Peter are 60 kg and 70 kg respectively.

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

4. Find the degree of the polynomial  $5x^3 - 17x^2 + 9x + 6$  .

- A. 3
- B. 4
- C. 5
- D. 6

5. Martin solved the equation  $8 - 3(1 + x) = 7 - 2x$  as follows:

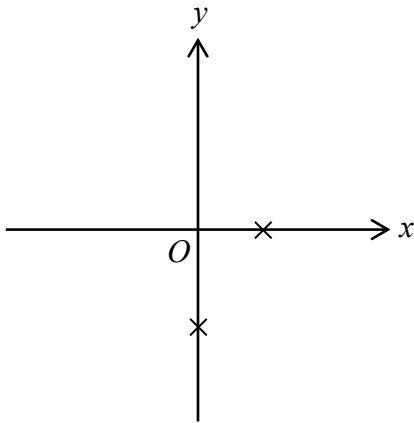
1 <sup>st</sup> line	$8 - 3 - 3x = 7 - 2x$
2 <sup>nd</sup> line	$5 - 3x = 7 - 2x$
3 <sup>rd</sup> line	$5 - x = 7$
4 <sup>th</sup> line	$x = 7 - 5$
5 <sup>th</sup> line	$x = 2$

Determine on which line Martin first made a mistake.

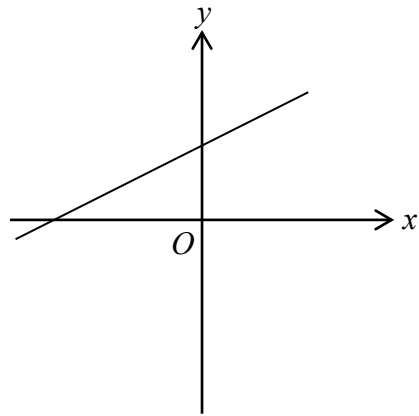
- A. 1<sup>st</sup> line
- B. 2<sup>nd</sup> line
- C. 3<sup>rd</sup> line
- D. 4<sup>th</sup> line

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

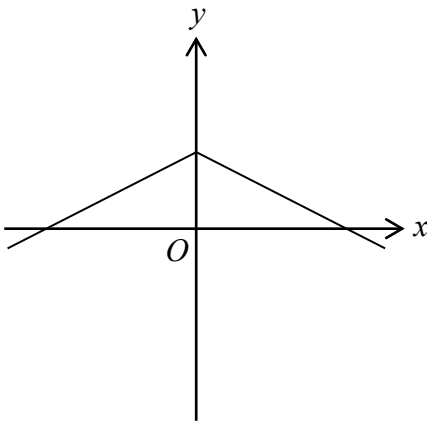
A.



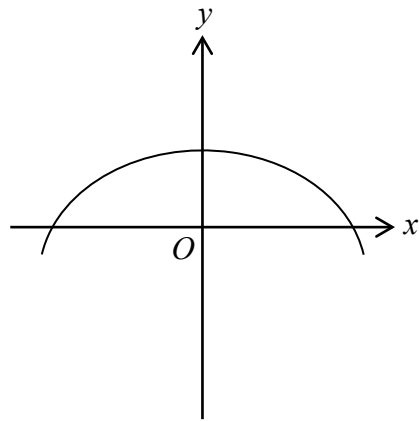
B.



C.



D.



7. Let the price of a shirt be \$  $x$  and the price of a belt be \$  $y$ . Peter spends \$220 to buy 2 shirts and 1 belt. The price of a shirt is higher than that of a belt by \$20. Which of the following pairs of simultaneous equations shows the relation between  $x$  and  $y$ ?

A. 
$$\begin{cases} x + 2y = 220 \\ x - y = 20 \end{cases}$$

B. 
$$\begin{cases} 2x + y = 220 \\ x - y = 20 \end{cases}$$

C. 
$$\begin{cases} x + 2y = 220 \\ y - x = 20 \end{cases}$$

D. 
$$\begin{cases} 2x + y = 220 \\ y - x = 20 \end{cases}$$

8. Which of the following is an identity?

A.  $2(x - 6) = 2x - 6$

B.  $\frac{x-6}{2} = x-3$

C.  $x - 6 = -6 + x$

D.  $x - 6 = 0$

9. In 3 Mathematics tests, Mary gets 76, 62 and  $x$  marks. The average mark of these 3 tests is greater than 70. Which of the following inequalities can be used to find the range of values of  $x$ ?

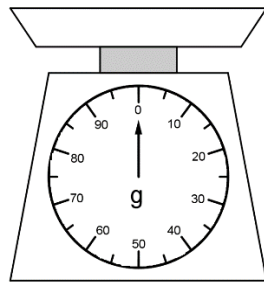
A.  $\frac{76+62+x}{3} \geq 70$

B.  $\frac{76+62+x}{3} > 70$

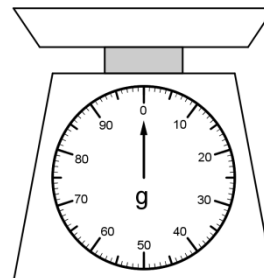
C.  $\frac{76+62+x}{3} \leq 70$

D.  $\frac{76+62+x}{3} < 70$


10.



Scale A



Scale B

The above figure shows Scale A and Scale B with different graduations. Mary wants to find the weight of a paper clip . Which of the following methods is the best?

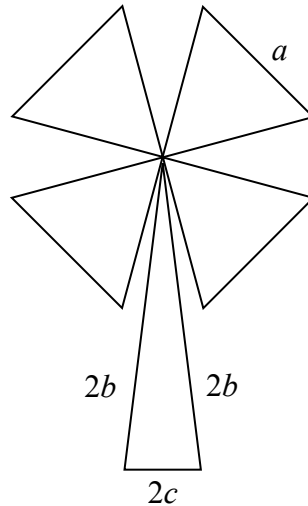
A. Mary uses scale A to measure the weight of a paper clip.

B. Mary uses scale B to measure the weight of a paper clip.

C. Mary uses scale A to measure the total weight of 20 paper clips and then divides the total weight by 20.

D. Mary uses scale B to measure the total weight of 20 paper clips and then divides the total weight by 20.

11.



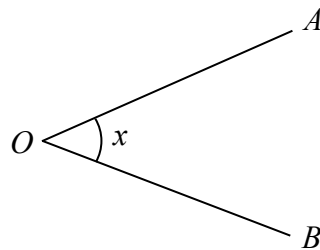
The above figure is formed by 4 identical equilateral triangles and one isosceles triangle. The length of each side of the equilateral triangles is  $a$ , while the lengths of the sides of the isosceles triangle are  $2b$ ,  $2b$  and  $2c$ .

By considering the **dimensions**, determine which of the following could express the area of the above figure.

- A.  $4a^3 + 8b^2c$
- B.  $\sqrt{3}a^2 + c\sqrt{4b^2 - c^2}$
- C.  $12a + 4b + 2c$
- D.  $\frac{\sqrt{6} + \sqrt{2}}{4}a + \sqrt{4b^2 - c^2}$

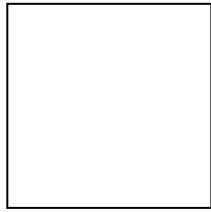
12. In the figure,  $x$  is

- A. a reflex angle.
- B. an obtuse angle.
- C. an acute angle.
- D. a straight angle.

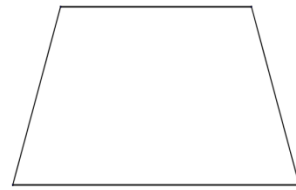


13. Choose the figure which has exactly 3 axes of symmetry.

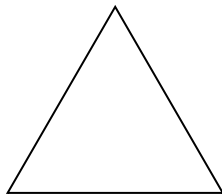
A. Square



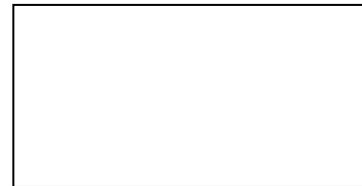
B. Trapezium



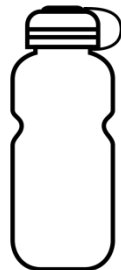
C. Equilateral triangle



D. Rectangle



14.



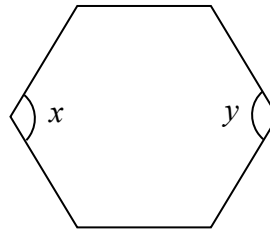
Will the size and shape of the above figure be changed after reflection?

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

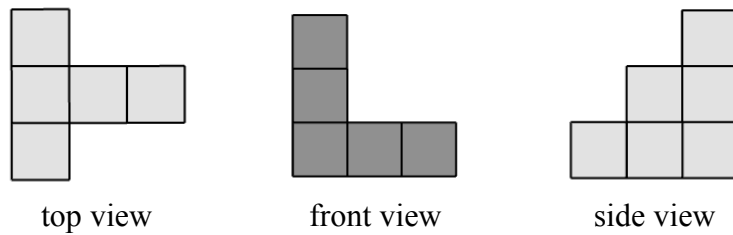


15. In the figure,  $x$  and  $y$  are

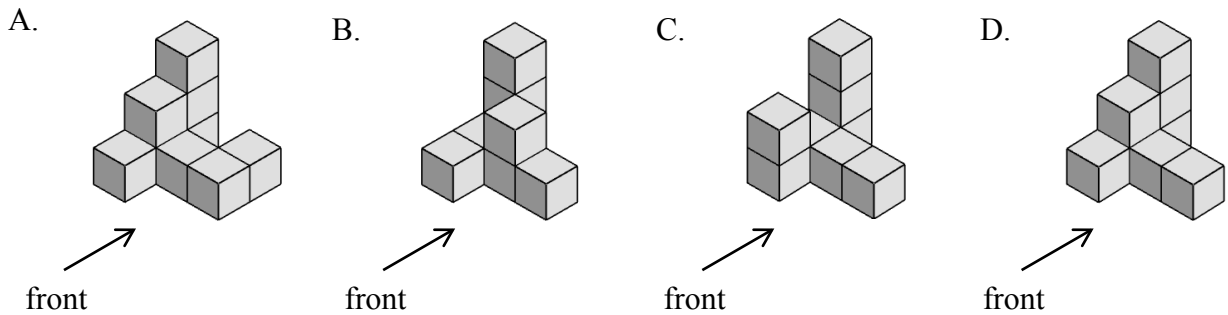
- A. exterior angles of the hexagon.
- B. interior angles of the hexagon.
- C. vertically opposite angles.
- D. corresponding angles.



16. The figures below show the 2-D representations of a solid from various views.



Which of the following could be the solid?



17. The slopes of 3 lines  $L_1$ ,  $L_2$  and  $L_3$  are shown in the following table:

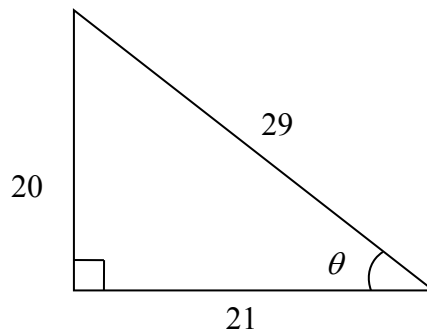
Line	$L_1$	$L_2$	$L_3$
Slope	4	-4	$-\frac{1}{4}$

Which of the following is correct?

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

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

- A.  $\frac{20}{21}$
- B.  $\frac{21}{29}$
- C.  $\frac{29}{20}$
- D.  $\frac{20}{29}$



19. Mary wants to know how many traffic accidents happened in Hong Kong in 2015. Which of the following is the most suitable method?

- A. Observe and record the number of traffic accidents which happened on a road every day.
- B. Interview citizens randomly by phone.
- C. Collect the opinions of drivers through questionnaires.
- D. Search for information of the number of traffic accidents from the website of the Transport Department.

20. Tony held an election for 'My favourite restaurant' on a website. The table below shows the number of votes obtained by each restaurant.

Restaurant	A	B	C	D	E
Number of votes	107	81	23	54	69

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

- A. Bar chart
- B. Stem-and-leaf diagram
- C. Scatter diagram
- D. Broken line graph

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

21. The following figure shows the floor guide of a shopping mall. The mall is a 4-storey building. Under the ground floor, there are 2 floors of basement.  
If  $-1$  represents B1 and  $+2$  represents 2/F, use a directed number to represent each of the following floors:

- (i) 3/F  
(ii) B2

3/F	Furniture
2/F	Children's wear
1/F	Men's wear
G/F	Women's wear
B1	Supermarket
B2	Car park

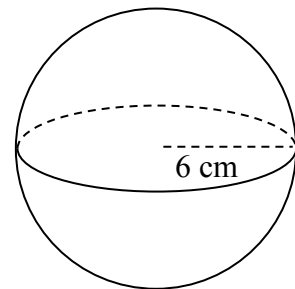
22. Round off 4.065 8 to 3 significant figures.
23. A scientific formula is given as follows:
- $$R = p \times \frac{\ell}{a^2}$$
- If  $R = 5$ ,  $a = 7$  and  $p = 4.9$ , find the value of  $\ell$ .

24. Figure 1 to Figure 4 consist of 4, 8, 12 and 16 dots respectively.

Figure 1	• • • •
Figure 2	• • • • • • • •
Figure 3	• • • • • • • • • • • •
Figure 4	• • • • • • • • • • • • • • • •

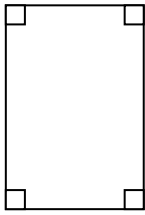
According to the above pattern, how many dots does Figure  $n$  consist of? (Express the answer in terms of  $n$ .)

25. Find the coefficient of  $y$  in the polynomial  $5y^2 - 8y + 4$ .
26. Factorize  $x^2 + 2x + 1$ .
27. Solve the equation  $3x + 29 = 5 - x$ .
28. Expand  $(a + 8)^2$ .
29. Consider the formula  $P = \frac{3a + 2b}{c^2}$ . If  $a = 18$ ,  $b = 9$  and  $c = 6$ , find the value of  $P$ .
30. Solve the inequality  $5x + 6 > 21$ .
31. The figure shows a sphere of radius 6 cm. Find the volume of the sphere. Give the answer correct to the nearest  $\text{cm}^3$ .

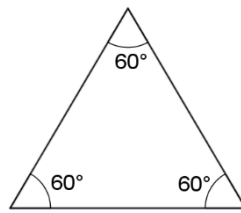


32. Which of the following polygons **MUST** be equilateral? (May be more than one answer)

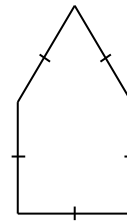
P.



Q.

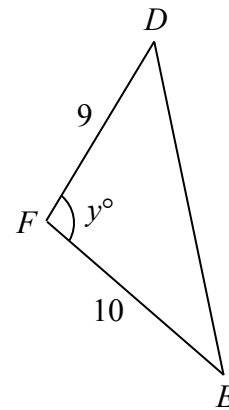
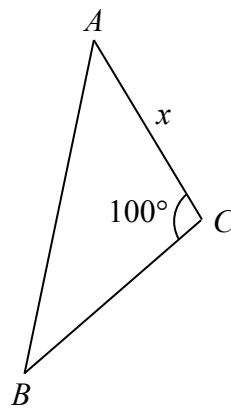


R.

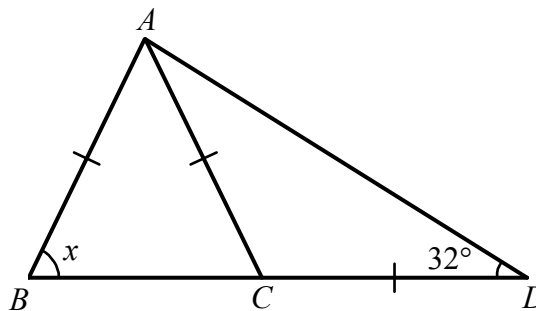


33. In the figure,  $\triangle ABC \cong \triangle DEF$ . Find

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

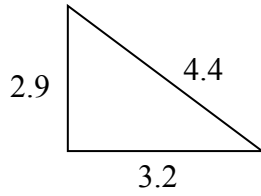


34. In the figure,  $BCD$  is a straight line,  $AB = AC = CD$  and  $\angle ADC = 32^\circ$ . Find  $x$ .

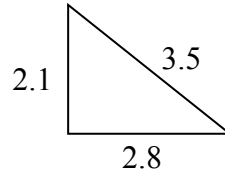


35. Which of the following must be right-angled triangle(s)? (May be more than one answer)

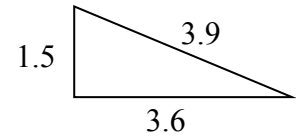
Triangle *A*



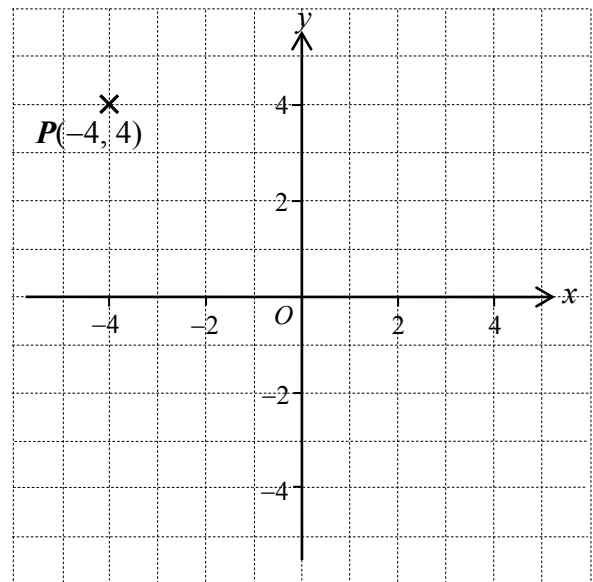
Triangle *B*



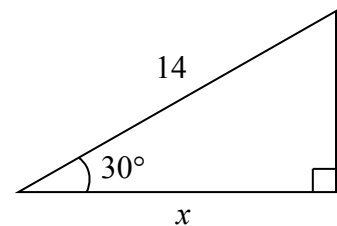
Triangle *C*



36.  $P(-4, 4)$  is translated 6 units to the right to  $P'$ . Find the coordinates of  $P'$ .



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



38. The following data show the number of multiple choice questions answered correctly by 15 students in a Mathematics test.

4	10	21	24	16
35	18	29	12	38
41	32	15	27	30

Use the data to complete the two frequency distribution tables in the **ANSWER BOOKLET**.

39. The table below shows the marks that Ivy got in an examination and the weight of each subject. The full marks of all subjects are equal.

	Subject			
	Chinese Language	English Language	Mathematics	Liberal Studies
Mark	75	70	92	96
Weight	40%	30%	20%	10%

Find the weighted mean mark of Ivy.

SECTION C: All working must be clearly shown.

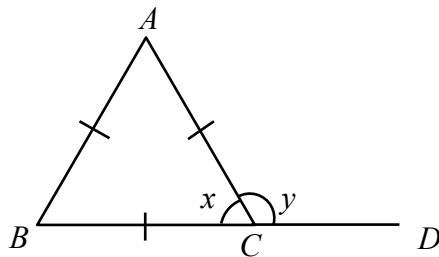
Write the mathematical expressions, answers and statements/conclusions in the spaces provided in the ANSWER BOOKLET.

40. The cost of a jacket is \$420. It is sold at a profit of 35%, find the profit.

41. (a) Simplify  $a^{-4} \cdot a^7$  and express the answer with positive index.

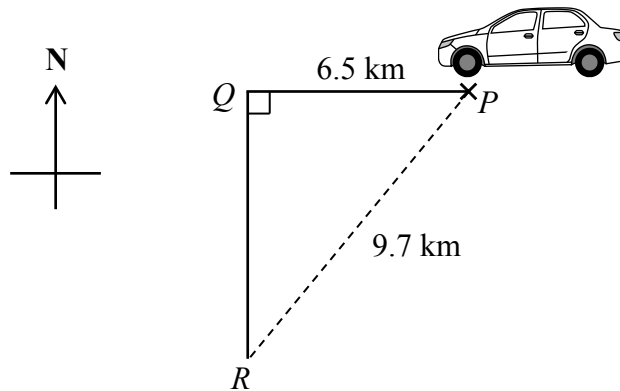
(b) Simplify  $(a^{-4} \cdot a^7)^2$  and express the answer with positive index.

42. In the figure,  $\triangle ABC$  is an equilateral triangle.  $BCD$  is a straight line. Find  $x$  and  $y$ .





43. A car starts from  $P$  and travels 6.5 km due west to  $Q$ . Then it travels due south to  $R$ . If  $PR$  is 9.7 km, find  $QR$ .



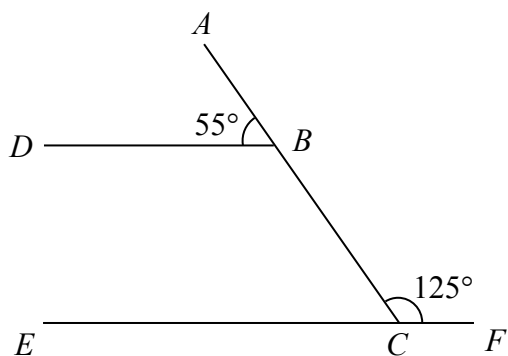
44. Complete the table for the equation  $3x + 2y - 6 = 0$  in the **ANSWER BOOKLET**.

$x$	-2	0	4
$y$	6		

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

45. A two-digit number is formed by the digits 3, 6, 8 at random. The digits can be repeated. For example: 36, 86, 88
- (a) Some of the possible outcomes are given in the table provided in the **ANSWER BOOKLET**. Fill the remaining ones in the blanks.
- (b) Find the probability that the two-digit number formed is a multiple of 9.

46. In the figure,  $ABC$  and  $ECF$  are straight lines.  $\angle ABD = 55^\circ$  and  $\angle ACF = 125^\circ$ .  
Prove that  $BD \parallel FE$ .



47. Solve the simultaneous equations  $\begin{cases} y = 2x + 4 \\ x + y = 19 \end{cases}$ .

END OF PAPER

**Do not write on this page.**

**Answers written on this page will not be marked.**

