YEAR 7 MATHEMATICS
Written examination

Reading time: 15 minutes
Writing time: 3 hours

2021 version 1

QUESTION BOOK

Structure of book

Section	Number of questions	Number of questions to be answered	Number of marks
A	20	20	20
B	10	10	50
C	3	3	30
			Total 100

SECTION A

Question 1

The highest common factor of 72 and 45 is

A. 2

B. 5

C. 6

D. 9

Question 2

$$5, -3, -4, 0, 8$$

Which one of the following lists the integers above in ascending order?

A. –3, –4, 0, 5, 8

B. –4, –3, 0, 5, 8

C. –4, –3, 5, 8, 0

D. 0, –3, –4, 5, 8

Question 3

$x \div y \times z$ simplifies to

A. xyz

B. $\dfrac{xy}{z}$

C. $\dfrac{xz}{y}$

D. $\dfrac{1}{xyz}$

Question 4

Which one of the following statements is **true**?

A. $3 - (-2) = 1$

B. $-16 \div 2 = -8$

C. $\dfrac{1}{4}$ is a whole number

D. $(-1)^2 = -1$

Question 5

The rectangle shown below is made up of eight identical squares.

The proportion of the total area of the rectangle that is shaded, expressed as a **decimal**, is

A. 0.375

B. 0.3

C. 0.625

D. $\dfrac{3}{8}$

Question 6

Melanie is 35 years of age and Kirby is 40 years of age.

The ratio of Kirby's age to Melanie's age in simplest form is

A. $40:35$

B. $7:8$

C. $8:7$

D. $1:\dfrac{8}{7}$

The following information relates to Questions 14 - 15.

The picture diagram below shows the data about a group of people's occupations.

Occupation	Number of people
Education	👤 👤 👤 👤
Travel	👤 👤 👤
Retail	👤 👤 👤 👤 👤
Public service	👤 👤 👤 👤
Technology	👤 👤 👤

Key: Each 👤 represents 2 people.

Question 14
The total number of people in this data is
A. 19
B. 28
C. 32
D. 38

Question 15
The percentage of people who work in retail is closest to
A. 5%
B. 10%
C. 26%
D. 27%

SECTION B

> **Instructions for Section B**
> Answer **all** questions.
> In all questions where a numerical answer is required, an **exact** value must be given unless otherwise specified.
> In questions where more than one mark is available, appropriate working **must** be shown.
> Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

Question 1 (5 marks)

a. Find the difference between the integers 3 and –4.   1 mark

_____

_____

b. Evaluate $4 \times (1 - 5) + (-1)^2$.   2 marks

_____

_____

_____

c. The following transactions are made from a personal bank account one month.   2 marks

Opening balance	$350.00
Deposit	$250.00
Withdrawal	$115.50
Withdrawal	$25.50
Closing balance	

Find the closing balance of the account.

_____

_____

_____

Question 5 (5 marks)

a. Draw the resulting image when the shape below is reflected across the dotted in the following   2 marks
grid.
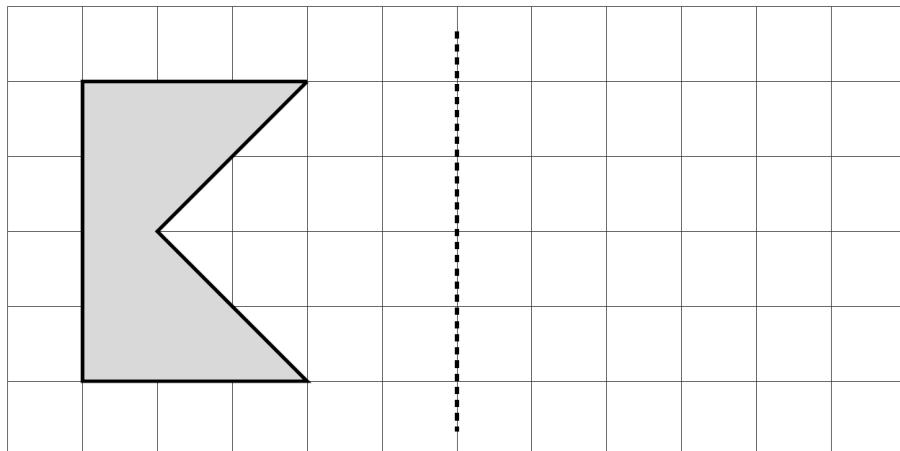
b. The diagram shows that a shape that has been transformed twice.   2 marks
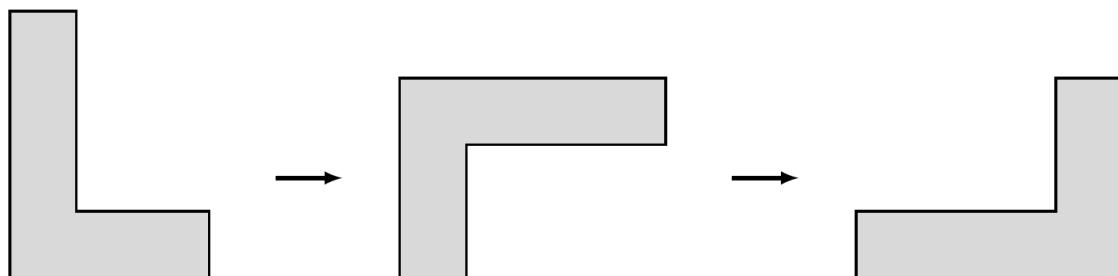
Complete the following paragraph with the appropriate word or numbers.

The shape has first been rotated by _____ degrees clockwise, and then the resulting shape is rotated again 180 degrees _____ .

c. Write down the order of rotational symmetry of the regular pentagon shown below.   1 mark
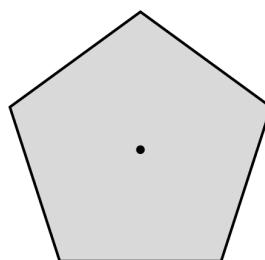
Question 6 (5 marks)

Consider the rectangular prism shown below.

1 m

1 m

6 m
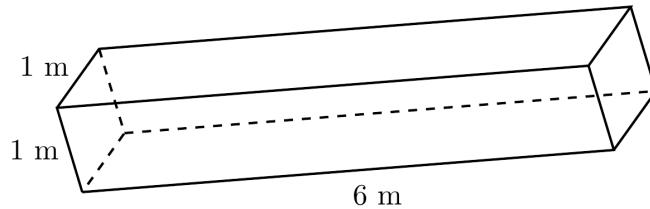
a. Find the volume of the prism.   2 marks

_____

_____

_____

b. On the grid of metre squares below, complete the drawing of the net diagram for this rectangular prism.   3 marks
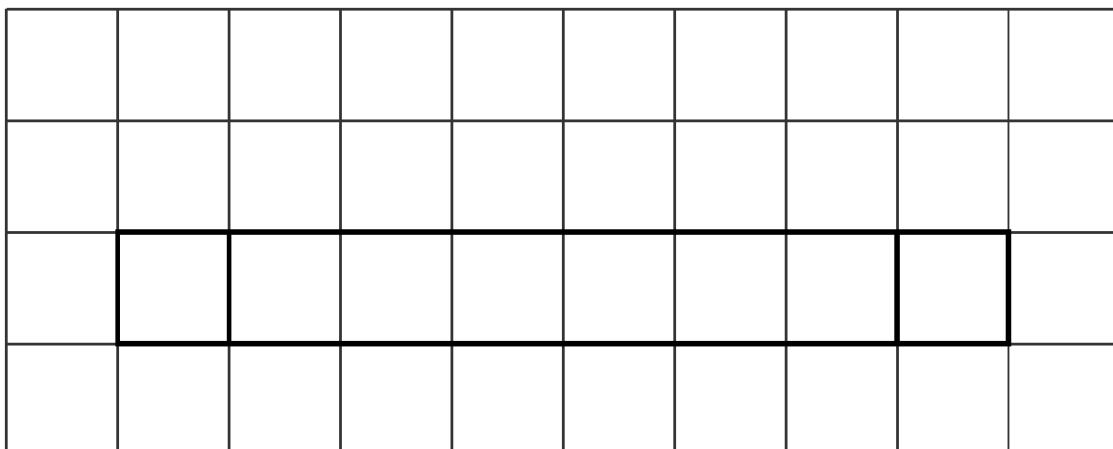
Question 10 (5 marks)

This sector graph below shows the preferred electronic device of 200 working professionals.
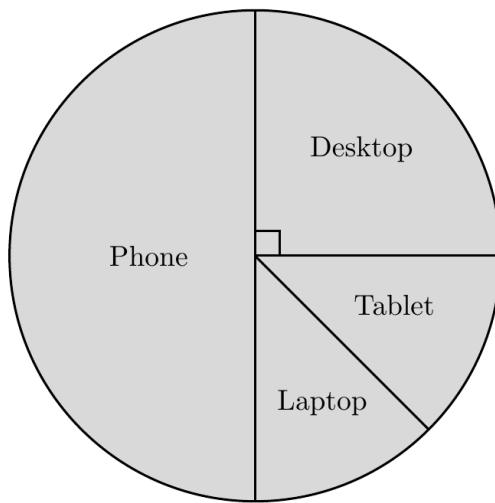
The ratio of the number of working professionals who prefer using tablets to those who prefer using laptops was 13:12.

a. Which device is the most preferred by the working professionals?   1 mark

_____

_____

b. Find the number of working professionals who prefer using desktops.   2 marks

_____

_____

_____

c. Find how many more working professionals prefer using tablets than using laptops.   2 marks

_____

_____

_____

_____

END OF SECTION B

SECTION C

Instructions for Section C
Answer **all** questions. In all questions where a numerical answer is required, an **exact** value must be given unless otherwise specified. In questions where more than one mark is available, appropriate working **must** be shown. Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

Question 1 (10 marks)
A local stationery shop sells notebooks and scissors at the prices shown.
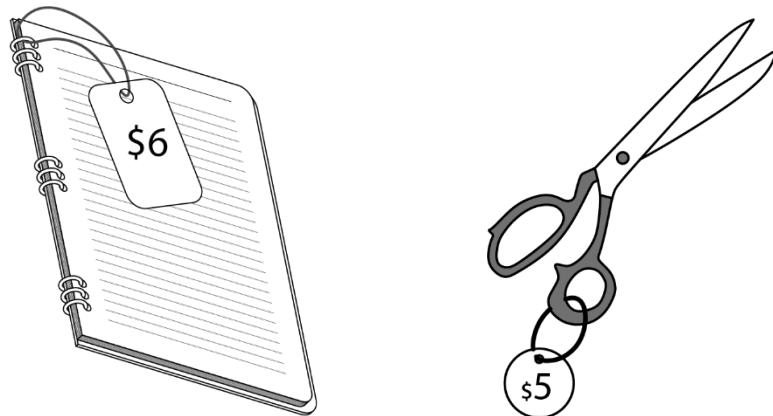
a. How much more expensive is a notebook than a pair of scissors? 1 mark

_____

_____

b. The cost of the notebook is x% higher than the cost of the scissors. 2 marks
Find the value of x.

_____

_____

_____

_____

Question 3 (10 marks)
Isabelle has the following 12 cards.
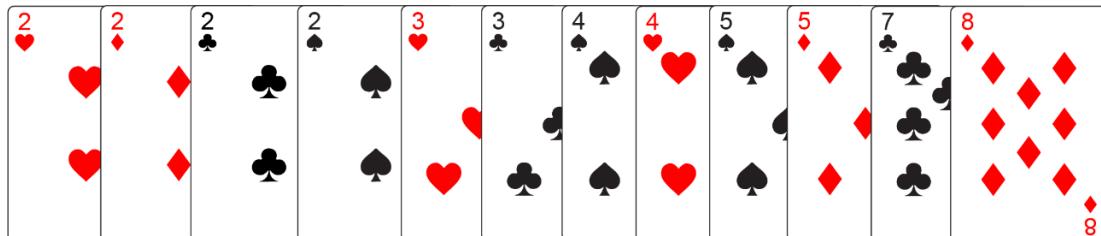
a. How many cards are even?   1 mark

_____

Isabelle picks a card without looking.

b. What is the probability that the number is even?   1 mark

_____

c. What is the probability that the number is prime?   2 marks

_____

_____

d. What is the probability that the card is either hearts or more than 3?   2 marks

_____

_____

e. What is the probability that the card is not hearts and at most 3?   2 marks

_____

_____

f. State two events that occur with probability $\frac{1}{2}$.   2 marks

_____

_____

END OF QUESTION AND ANSWER BOOK

SOLUTIONS

SECTION A

Question	Answer
1	D
2	B
3	C
4	B
5	A
6	C
7	D
8	B
9	C
10	D
11	A
12	B
13	C
14	D
15	C
16	A
17	B
18	A
19	D
20	A

Question 1

The highest common factor for 72 and 45 is 9.

Answer is **D**.

Question 2

The integers are listed in ascending or below.

–4, –3, 0, 5, 8

Answer is **B**.

Question 3

$$x \div y \times z = x \times \frac{1}{y} \times z$$

$$= \frac{xz}{y}$$

Answer is **C**.

Question 15

$$\frac{10}{38} \times 100 = 26.315...\%$$

Therefore, 26% is the option with the closest percentage.

Answer is **C**.

Question 16

16 is not much greater than 13, therefore it is not an outlier.

All of the other statements are true.

Answer is **A**.

Question 17

$$\text{mean} = \frac{136}{16}$$
$$= 8.5$$

Answer is **B**.

Question 18

A probability of 0.01 could be described as very unlikely.

Answer is **A**.

Question 19

$\text{Pr}(7 \text{ is not selected})$
$= 1 - \text{Pr}(7 \text{ is selected})$
$= 1 - \dfrac{1}{10}$
$= \dfrac{9}{10}$

Answer is **D**.

Question 2 (10 marks)

a.   2 marks

Number of faces	5
Number of edges	9 (A1)
Number of vertices	6 (A1)

b.   2 marks

$\text{Perimeter} = 3 + 5 + 3$ (A1)

$\qquad = 11 \text{ cm}$ (A1)

c.   2 marks

$\text{Volume} = 10 \times 15$ (A1)

$\qquad = 150 \text{ cm}^3$ (A1)

d.   2 marks

$\text{Area} = 2 \times 10 + 5 \times 15 + 3 \times 15 + 3 \times 15$ (A1)

$\qquad = 185 \text{ cm}^2$ (A1)

e.   2 marks

The weight of the box is

$5.1 \times 1000 - 32 \times 155$ (A1)

$= 140 \text{ g}$ (A1)

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			Total 100

SECTION A

Question 1

$\sqrt{9}$ evaluates to

A. 3

B. 4.5

C. 18

D. 90

E. 81

Question 2

$\dfrac{42y^3z^2}{6yz}$ simplifies to

A. $7yz$

B. $\dfrac{y^2z}{7}$

C. $7y^2$

D. $7y^2z$

E. $\dfrac{7}{y^2z}$

Question 3

Tabitha charges $37.50 per hour for tutoring students.

The length of a session in which she earns $62.50 is

A. 1 hour and 40 minutes

B. 1 hour and 30 minutes

C. 1 hour and 15 minutes

D. 1 hour and 45 minutes

E. 1 hour and 50 minutes

Question 7

Jack, initially at rest, leaves home and travels to a nearby park at a constant speed.

After stopping at the park for a period of time, Jack then travels back home at a constant speed.

Which one of the following graphs shows Jack's journey?
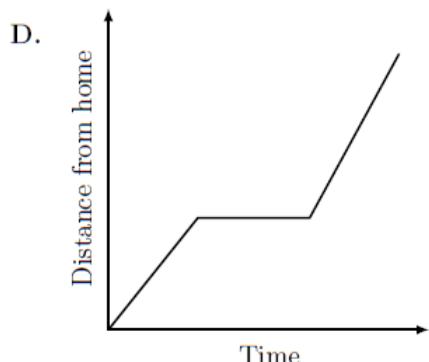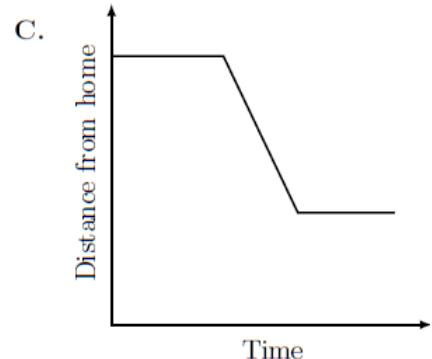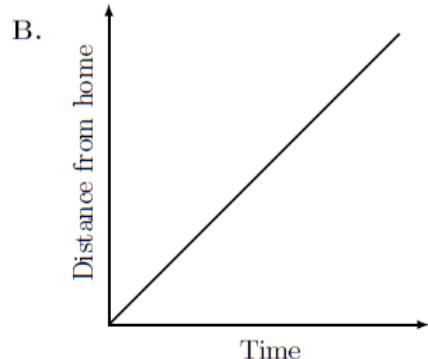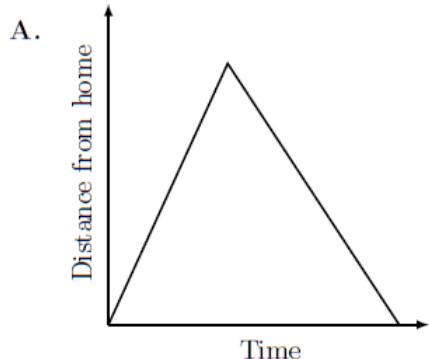
Question 8

If the sum of 4 and the triple of a number is 19, this number is

A. 3

B. 4

C. 5

D. 15

E. 23

The following information relates to Questions 9 - 10.

Struan travelled from Sydney to Christchurch on Monday.
His boarding pass is shown below.

Struan's flight departed at 2301 on the same day.

Question 9

The number of minutes between the flight's departure time and the boarding time was

A. 20 minutes

B. 26 minutes

C. 35 minutes

D. 36 minutes

Question 10

The duration of Struan's flight was 6 hours and 15 minutes.

Christchurch is two hours ahead of Sydney.

On what day and at what time did Struan arrive in Christchurch?

A. On Monday at 5:16 am, Christchurch local time

B. On Tuesday at 7:16 am, Christchurch local time

C. On Monday at 7:16 am, Christchurch local time

D. On Tuesday at 7:16 pm, Christchurch local time

SECTION B

Instructions for Section B

Answer **all** questions.

In all questions where a numerical answer is required, an **exact** value must be given unless otherwise specified.

In questions where more than one mark is available, appropriate working **must** be shown.

Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

Question 1 (5 marks)

a. Round 0.582 to one decimal place.   1 mark

_____

_____

b. Evaluate $\dfrac{4 \times (3-5) + (-2)}{100 \div 2^2}$.   2 marks

_____

_____

_____

c. Evaluate 5^0.   1 mark

_____

_____

d. Express $(2^3)^2$ in the form 2^n, where n is a positive integer. 1 mark

_____

_____

Question 3 (5 marks)
Consider the quadrilateral *ABCD* shown below.
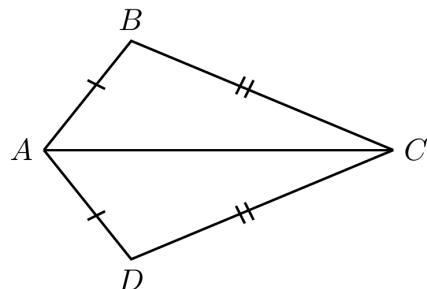
a. Complete the following sentences by writing the appropriate numbers or symbols in the boxes   2 marks
provided below.

The length of *AB* is equal to the length of ☐ .

The length of *BC* is equal to the length of ☐ .

b. Which side is common to both triangles?   1 mark

_____

c. Circle the correct congruence test that proves triangle *ABC* is congruent to triangle *ADC*.   1 mark

SSS   SAS   AAS   RHS

d. What is the name of quadrilateral *ABCD*?   1 mark

_____

Question 7 (5 marks)

a. Show that 150 seconds is equivalent to 2.5 minutes.   1 mark

_____

_____

b. What time will it be 2 hours and 55 minutes after 1:45 pm?   2 marks

_____

_____

_____

c. The following paragraph is about the hour hand of an analogue clock.   2 marks
Complete the sentences by writing the appropriate numbers or symbols in the boxes provided
below.

The hour hand of a 12-hour analogue clock turns 360° in 12 hours.
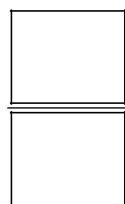
Therefore, the hour hand rotates at $\dfrac{\boxed{}}{\boxed{}} = 0.5$ degrees per minute.

In 16 minutes, the hour hand will rotate $\boxed{}$ degrees.

SECTION C

+---+
| **Instructions for Section C** |
| Answer **all** questions. |
| In all questions where a numerical answer is required, an **exact** value must be given unless |
| otherwise specified. |
| In questions where more than one mark is available, appropriate working **must** be shown. |
| Unless otherwise indicated, the diagrams in this book are **not** drawn to scale. |
+---+

Question 1 (10 marks)
Here are the first four shapes in a geometrical pattern.
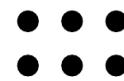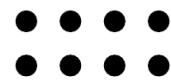
$n = 1$ $n = 2$ $n = 3$ $n = 4$

a. Draw the fifth shape of this pattern below.   2 marks

$n = 5$

b. Complete the table below for the pattern by writing down the correct numbers.   2 marks

Term of pattern, n	1	2	3	6
Number of circles, T	2		6	

c. Write the rule that relates n and T.   2 marks

_____

_____

d. Write the rule for the pattern in words.   2 marks

_____

_____

SECTION C - Continued

Question 2 (10 marks)
Daniel left home at 0900 to cycle to his friend's place. He arrived at his friend's place at 1100.
The following distance-time graph represents Daniel's journey.
The horizontal axis is in 24-hour time.
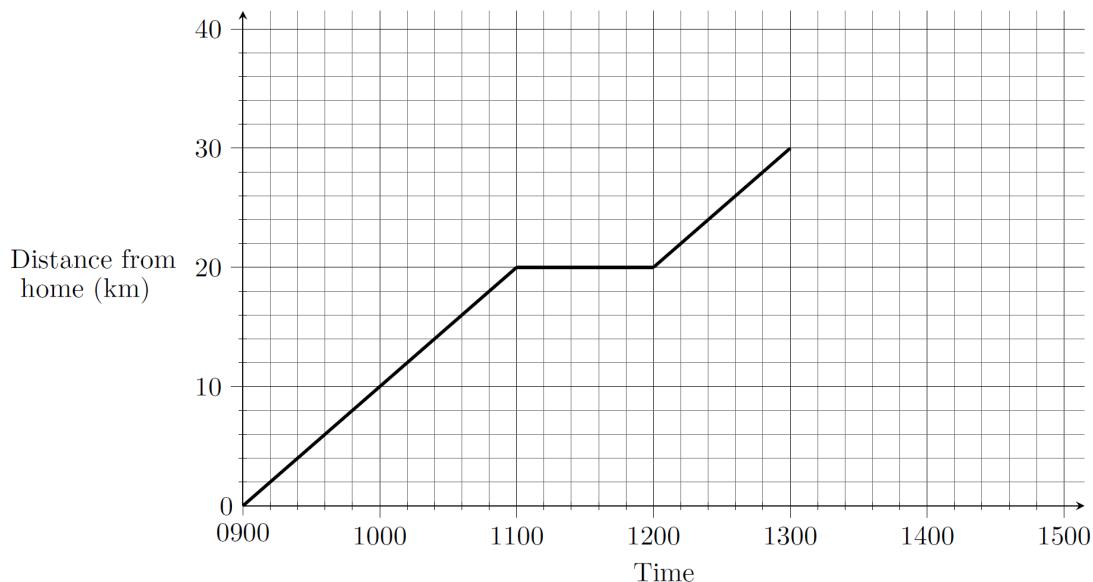
a. What is 0900 in 12-hour time?   1 mark

_____

b. How many hours did it Daniel to travel from home to his friend's place?   1 mark

_____

c. Calculate Daniel's speed between 0900 and 1100.   2 marks
    Give your answer in kilometres per hour.

_____

_____

_____

d. Daniel's speed between 1200 and 1300 is 10 kilometres per hour.   2 marks
    Convert this speed to metres per minute.
    Express your answer as an improper fraction.

_____

_____

Question 3 (10 marks)

The following column graph shows the number of languages spoken by people in a survey.
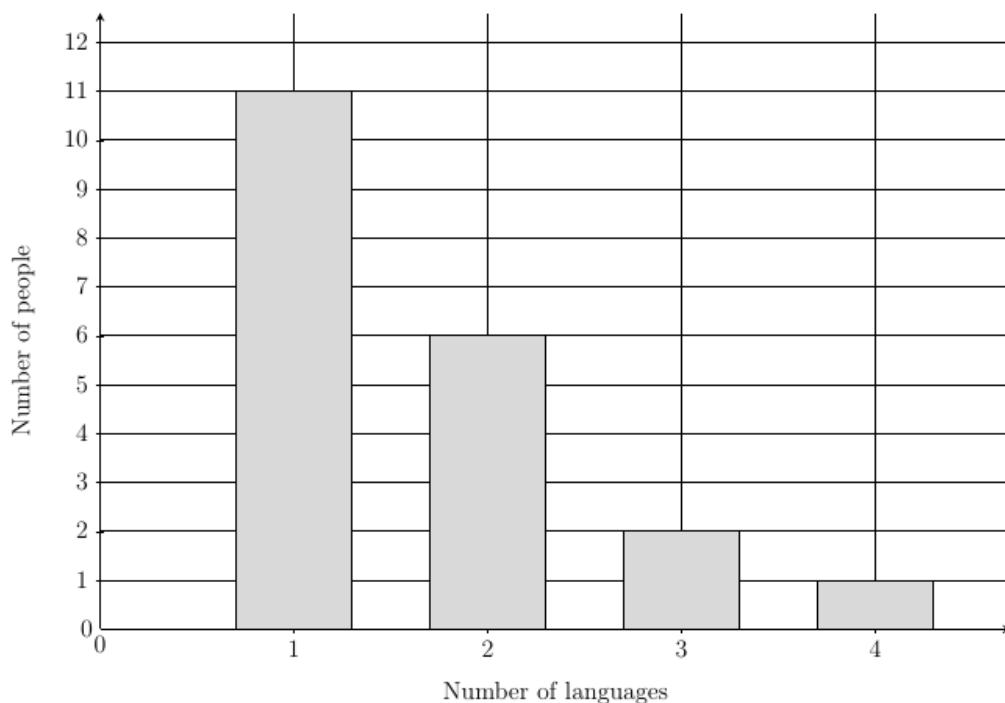
a. What is the number of languages spoken by most people surveyed?   1 mark

_____

b. Complete the following frequency table.   3 marks

x	f	$x \times f$
1	11	11
2		12
3		
4	1	
Total		33

e. Daniel started travelling back home at 1300 at a constant speed.   2 marks
   He arrived home at 1448.
   Show this information on the distance-time graph above.

f. Find the total distance that Daniel travelled for his entire journey.   2 marks

_____

_____

c. Calculate the mean number of languages spoken.   2 marks

_____

_____

_____

d. One of the surveyed people who speak at least n languages is randomly selected.   2 marks
The probability of this event is 0.45.
Find the value of n.

_____

_____

e. The data shown by the histogram has been collected through a survey.   2 marks
State two possible issues that could arise from using this data collection method.

_____

_____

_____

END OF QUESTION AND ANSWER BOOK

SOLUTIONS

SECTION A

Question	Answer
1	A
2	D
3	A
4	B
5	D
6	C
7	D
8	C
9	D
10	B
11	A
12	C
13	B
14	A
15	B
16	C
17	B
18	D
19	C
20	A

Question 1

$\sqrt{9} = 3$

Answer is **A**.

Question 2

$\dfrac{42y^3z^2}{6yz} = 7y^2z$

Answer is **D**.

Question 6 (5 marks)
a.   1 mark
$(0, -1)$ (A1)

b.   2 marks
$\text{Gradient} = \dfrac{2+4}{4+4}$ (A1)

$\qquad\quad = \dfrac{3}{4}$ (A1)

● Accept 0.75.

c.   1 mark
$y = \dfrac{3}{4}x - 1$ (A1)

d.   1 mark
No (A1)

● Working is not required.

Question 7 (5 marks)
a.   1 mark
$\dfrac{150}{60}$ (A1)

$= 2.5 \ \text{min}$

b.   2 marks
4:40 pm

● The hour part is correct. (A1)
● The minute part is correct. (A1)

**c.**   2 marks
$\dfrac{360}{12 \times 60}$ or $\dfrac{360}{720}$ or any equivalent fraction. (A1)

8 degrees (A1)

Question 8 (5 marks)

a.   3 marks
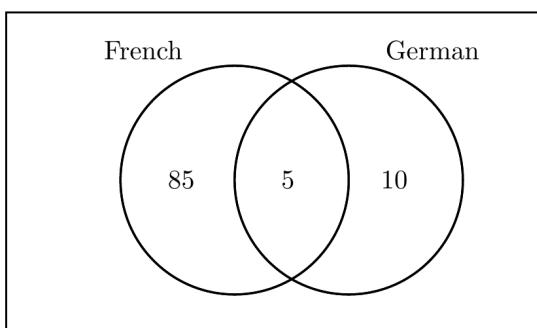
- All three numbers are correct. (A1)×3
- Penalise one mark per error.

b.   2 marks

$$\text{Pr(only French)} = \frac{85}{100} \quad \text{(A1)}$$

$$= \frac{17}{20} \quad \text{(A1)}$$

Question 9 (5 marks)

a.   2 marks

$$1 - \frac{3}{8} \quad \text{(A1)}$$

$$= \frac{5}{8} \quad \text{(A1)}$$

- Accept 0.625.

b.   2 marks

$$\frac{2+1}{8} \quad \text{(A1)}$$

$$= \frac{3}{8} \quad \text{(A1)}$$

- Accept 0.375.

c.   1 mark

0 (A1)