OCR-F Nov'19 P3

Answer **all** the questions.

1 **(a)** Here are some types of number.

An even number	An odd number	A prime number	A square number	A cube number

From the list, write down the type of number being described.

(i) A number that does **not** divide exactly by 2. an odd number [1] ✓

(ii) A number that has no factors except itself and 1. a prime number [1] ✓

(b) **(i)** Write down all the multiples of 4 between 21 and 29.

(b)(i) 24, 28 ✓ [1]

(ii) Write down a common multiple of 4 and 6.

(ii) 12 etc ✓ [1]

(c) Insert brackets to make this calculation correct.

$(4-1)\times 2=6$ ✓ [1]

(d) Write 7% as a fraction.

(d) $\frac{7}{100}$ ✓ [1]

2 Work out.

1.52 kg + 80 g

Give your answer in kilograms.

$$\begin{array}{r} 1.520 \\ +\ 0.080 \\ \hline 1.600 \end{array}$$ ✓

1.6 ✓

..... kg [2]

3 (a) Round 32629 to the nearest thousand.

3 2 6 2 9

(a) 33000 ✓ ..... [1]

(b) Round 32629 to 1 significant figure.

3 2 6 2 9

(b) 30000 ✓ ..... [1]

4 A circle has radius 5 cm.

(a) Work out the circumference of the circle.

$C = 2 \times \pi \times 5$ ✓

$= 10\pi = 31.4$ ✓

(a) ..... cm [2]

(b) Work out the area of the circle.

$A = \pi \times 5^2$ ✓

$= 25\pi = 78.55$ ✓

(b) ..... cm^2 [2]

5 Dan thinks of a number.
He adds 3 and divides the result by 2.
His answer is 16.

What number is Dan thinking of?

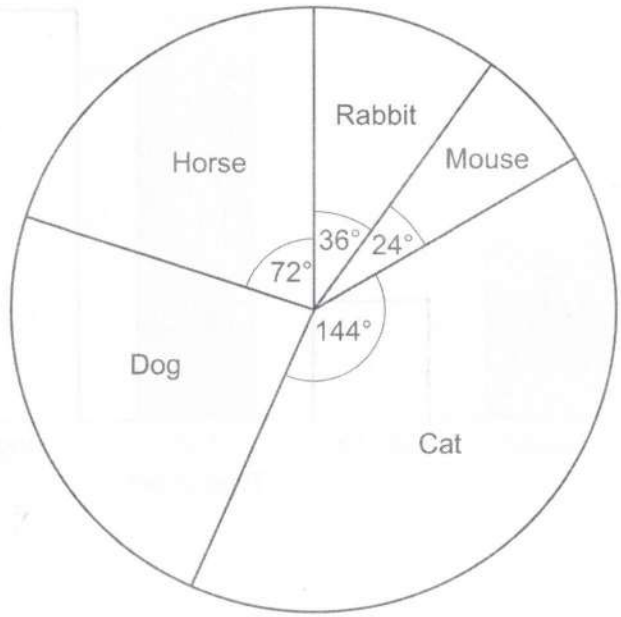
? → +3 → ÷2 → 16

16 x 2 = 32 ✓

32 - 3 = 29 ✓

..... **[2]**

6 30 students each own one pet.
The pie chart shows the proportion of each type of pet owned by the 30 students.



(a) Which type of pet is the mode?

Cat

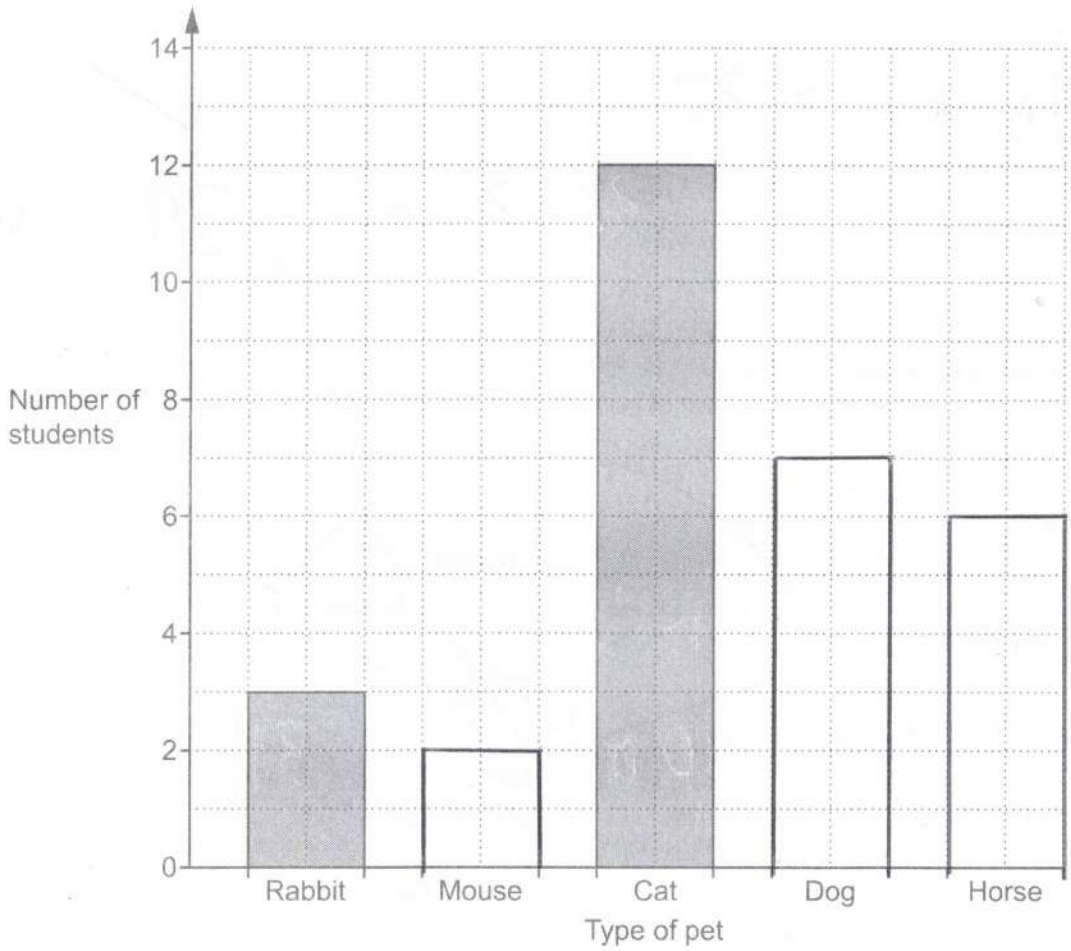
(a) ..... **[1]**

(b) Use the information in the pie chart to complete this bar chart.

$M = \frac{24}{360} \times 30 = 2$

$D = 30 - 6 - 2 - 3 - 12 = 7$ ✓

$H = \frac{72}{360} \times 30 = 6$



✓ ✓

[3]

7 Jenny has a five-sided **biased** spinner.
The sectors are coloured red, blue, green, yellow and white.
She spins the spinner 100 times.

The table shows the number of times the spinner lands on each colour.

Colour	Frequency
Red	28
Blue	38
Green	6
Yellow	0
White	28
Total	100

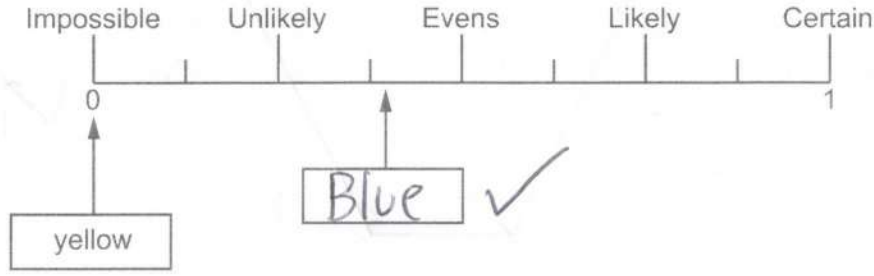
Jenny uses her data to estimate the probability of the spinner landing on each colour.

(a) Write down Jenny's estimate for the probability of landing on red.

$\frac{28}{100}$ ✓OE

(a) ..... [1]

(b) Jenny then writes in some of the colours on this probability scale.



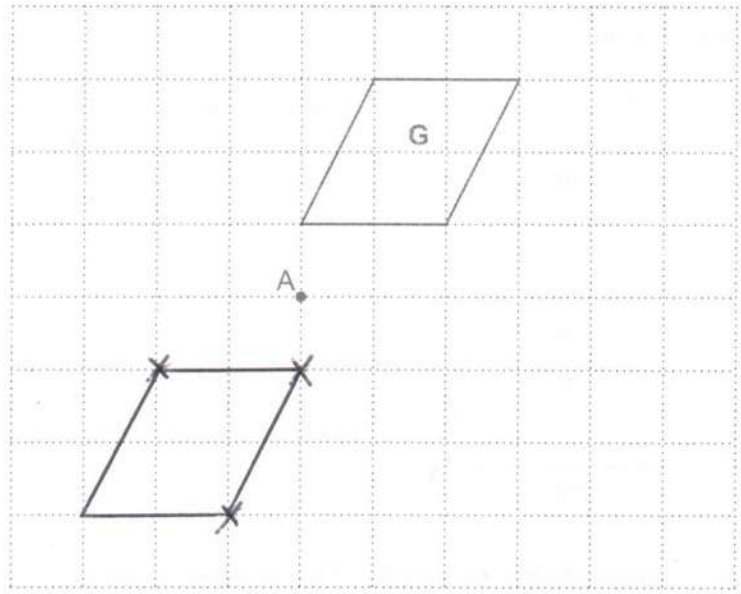
(i) Write the correct colour in the box. **[1]**

(ii) Explain why Jenny's estimate for the probability of landing on yellow cannot be the actual probability.

Yellow is a possible outcome ✓

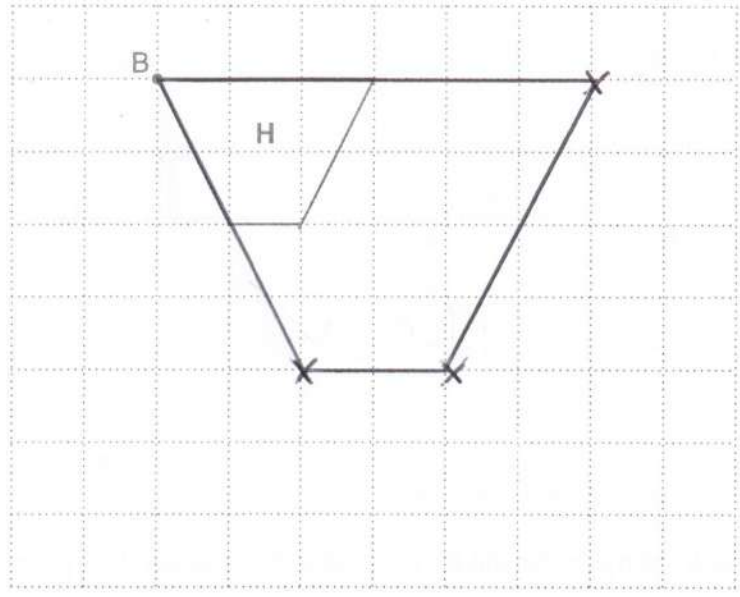
..... [1]

8 **(a)** Shape **G** is drawn on the grid.



Rotate shape **G** by 180° about the point A. **[2]**

(b) Shape **H** is drawn on the grid.



Enlarge shape **H** with scale factor 2 and the centre of enlargement at point B. **[2]**

9 Tom buys a radio for £40.
Later he sells it and makes a profit of 20%.

Tom says

The ratio of the price I paid for the radio to the price I sold the radio is 5 : 6.

Show that Tom is correct. [3]

$0.2 \times 40 = 8$ ✓

$\div 8$ (40 : 48) $\div 8$ ✓ ✓

5 : 6

10 Nada is planning the colour scheme for her bedroom.

The colour of her carpet can be blue (B), grey (G) or red (R).
The walls can be painted yellow (Y), white (W) or pink (P).

(a) Complete the table to show all of the possible colour combinations she can make.
You may not need all the rows.

Carpet	Walls
B	Y
B	W
B	P
G	Y
G	W
G	P
R	Y
R	W
R	P

✓ ✓

[2]

(b) Explain why it would **not** be mathematically correct to find the probability that Nada decides on a grey carpet and pink walls using this formula.

$$\frac{1}{\text{the total number of colour combinations}}$$

Not a totally random choice ✓

[1]

11 Multiply out.

(a) $3(x-2)$

$3x-6$ ✓

(a) ..... [1]

(b) $2a(a+b)$

✓ ✓

$2a^2+2ab$

(b) ..... [2]

12 **(a)** Find the value of

(i) $\sqrt[3]{216}$,

6 ✓

(a)(i) ..... [1]

(ii) 2^8.

256 ✓

(ii) ..... [1]

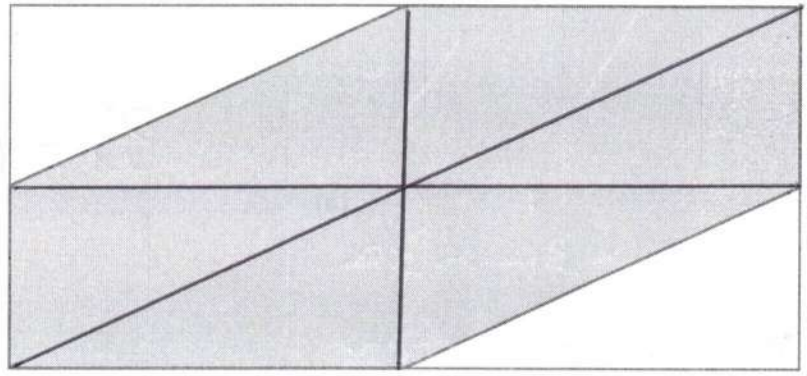
(b) The cube of 3 is added to the square root of 7.

Put a ring around the correct statement.

$\sqrt[3]{3}+7^2$ $\quad 3^3+7^2$ $\quad (3^3+\sqrt{7})$ $\quad \sqrt[3]{3}+\sqrt{7}$ ✓

[1]

13 The midpoints of the sides of a rectangle are joined by straight lines as shown.



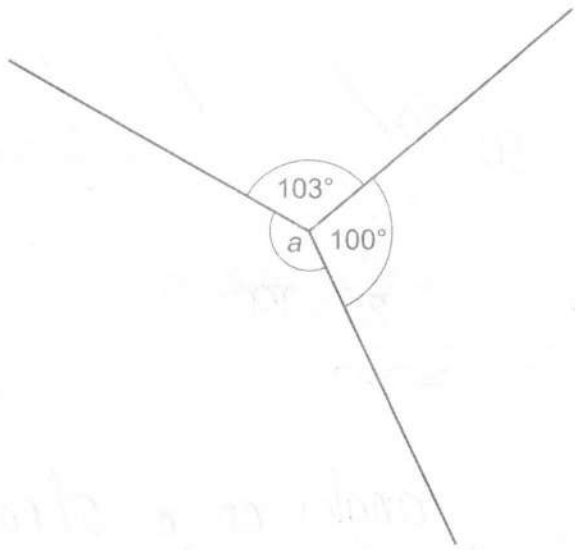
Work out the percentage of the rectangle that is shaded.

$\frac{6}{8} = \frac{3}{4}$ ✓✓

75 ✓

..... % **[4]**

14 (a) Three lines meet at a point.



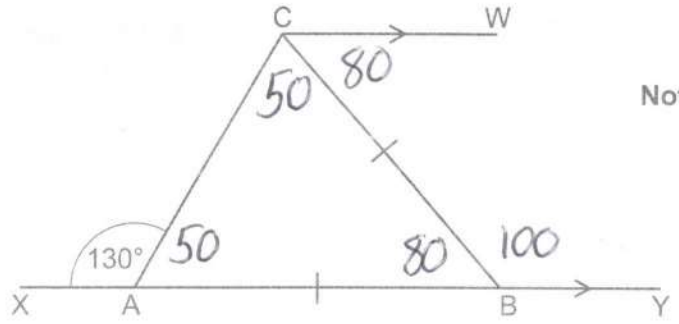
Not to scale

Work out the size of angle *a*.

360 - 100 - 103 ✓

(a) *a* = 157 ✓ ..... ° **[2]**

(b) XY and CW are parallel lines.
AB = CB.
Angle CAX = 130°.



Not to scale

(i) Complete this sentence.

Angle CAB = 50° because ..... angles on a straight line sum to 180 ..... [1]

(ii) Work out angle BCW.
Give a reason for each angle you work out.

∠ACB = 50 (base angles in isosceles triangle.) ✓

∠CBA = 80 (angles in a triangle sum to 180°) ✓

∠BCW = 80 (alternate angles are equal) ✓

80 ✓

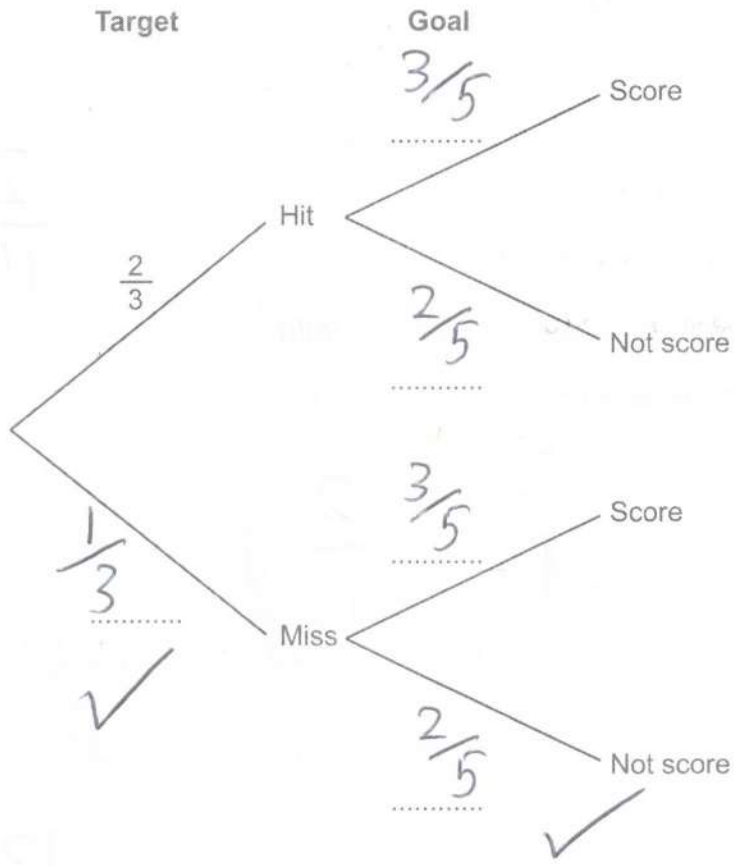
(b)(ii) ..... ° [4]

15 Ryan shoots an arrow at a target. He then kicks a ball at a goal.

The probability that Ryan hits the target is $\frac{2}{3}$.

The probability that Ryan scores a goal is $\frac{3}{5}$.

(a) Complete the tree diagram.



[2]

(b) Find the probability that Ryan

(i) misses the target and does not score a goal,

$\frac{1}{3} \times \frac{2}{5}$ ✓

$\frac{2}{15}$ ✓

(b)(i) ..... **[2]**

(ii) either hits the target or scores a goal or both.

$1 - \frac{2}{15}$ ✓

$\frac{13}{15}$ ✓

(ii) ..... **[2]**

16 Solve the simultaneous equations.

$$2x - y = 7$$
$$2x + y = 5$$

$+$

$$4x = 12$$ m ✓

$$x = \frac{12}{4} = 3$$

① $\Rightarrow$ $6 - y = 7$

$-1 = y$

$x =$ 3 ✓

$y =$ −1 ✓ **[3]**

17 Two model cars, **A** and **B**, are in a race.
They start together on the starting line.
Assume each car travels at a constant speed.

Car **A** takes 30 seconds to complete each lap of the track.
Car **B** takes a whole number of seconds to complete each lap of the track.
The two cars next cross the starting line together 150 seconds after the start of the race.

Find the **four** possible times that car **B** could take to complete one lap.

You may find this information helpful.

$150 = 2 \times 3 \times 5 \times 5$
$30 = 2 \times 3 \times 5$

A

30

60

90

120

150

Need factors of 150 which aren't factors of 30, 60, 90 or 120

150 1
75 2
50 3
~~30~~ 5
25 6
15 10

m ✓

25 ✓ 50 ✓ 75 ✓ 150 ✓ seconds **[5]**

18 **(a)** Write down the multiplier for an increase of 140%.
Give your answer as a decimal.

⇒ 240 %

(a) 2·4 ✓ **[1]**

(b) Ali invests £1500 in October.
The investment increases in value by 10% in November.
It then decreases in value by 20% in December.

Ali says

10% - 20% = -10%, so the £1500 has lost exactly 10% of its value.

(i) Explain what Ali has done wrong.

Percentages won't be of the same amount **[1]**

(ii) Work out the correct percentage loss.

1500 x 1·10 x 0·80 ✓

= 1320 ✓

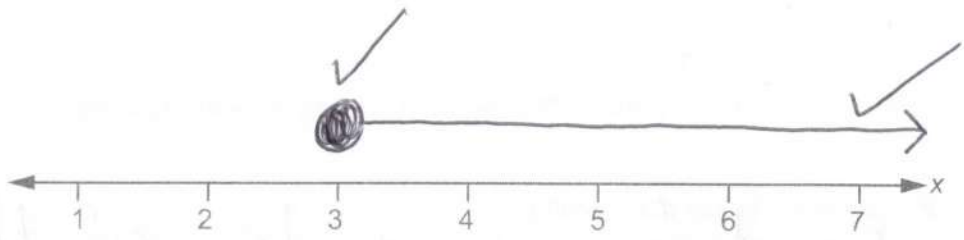
% Loss = $\frac{180}{1500}$ ✓ x 100 ✓

12 ✓ % **[5]**

19 Solve $3x - 5 \geqslant 10$.
Show your solution on the number line.

$3x \geqslant 15$

$x \geqslant 3$



[4]

20 Amrit's income is 32% more than Bethan's income.
Amrit and Bethan's combined income is £54 868.

Calculate Amrit's income.

B = 100% A = 132%

so 232% = 54 868

÷232

×132

132%

÷232

×132

£ 31218 **[5]**

21 Jacob, Amelie and Reuben each roll a fair six-sided dice.
What is the probability that all three roll a number less than 3?

Give your answer as a fraction in its simplest form.

$\frac{2}{6} \times \frac{2}{6} \times \frac{2}{6} = \frac{8}{216}$ ✓✓

$\frac{1}{27}$ ✓

..... **[3]**

22 The diagram shows two rectangles, A and B.

Rectangle A has a width of 25 cm and a height of 12 cm.
The width of rectangle B is three times the height of rectangle B.

The area of rectangle A is equal to the area of rectangle B.

Find the perimeter of rectangle B.

$25 \times 12 = 3x \times x$ ✓

$300 = 3x^2$ ✓

$100 = x^2$

$10 = x$ ✓

$30 + 10 + 30 + 10$ ✓ $= 80$ ✓

..... cm **[5]**

23 Kay invests £1500 in an account paying 3% **compound** interest per year.
Neil invests £1500 in an account paying r% **simple** interest per year.

At the end of the 5th year, Kay and Neil's accounts both contain the same amount of money.

Calculate r.
Give your answer correct to 1 decimal place.

(K) $1500 \times 1.03^5 = 1738.91...$ ✓✓✓

interest = 238.91

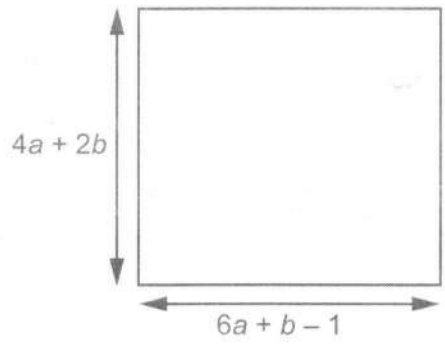
simple per year = $238.91 \div 5$
$= 47.78$ ✓

$\% = \frac{47.78}{1500} \times 100 = 3.185...$ m ✓

$r =$ 3.2 ✓ [6]

24 In this question, all lengths are in centimetres.

Here is a square.



Not to scale

Find the length of one side of the square when $b = 4$.

$4a + 8 = 6a + 4 - 1$ ✓✓

$5 = 2a$ ✓

$a = 2.5$ ✓

$4a + 2b$

$= 4 \times 2.5 + 2 \times 4$ ✓

$= 10 + 8$

$= 18$ ✓

..... cm **[6]**

END OF QUESTION PAPER