1. **(a)** Solve.

$4x + 3 = 13$

$4x = 13 - 3$

$\frac{4x}{4} = \frac{10^{5}}{\cancel{4}_{2}}$

$x = \frac{5}{2}$

(a) $x =$ $\frac{5}{2}$ **[2]**

(b) Multiply out and simplify.

$5(2x + 3) + 2(x - 4)$

$= 10x + 15 + 2x - 8$

$= 12x + 7$

(b) $12x + 7$ **[3]**

2. Dora has the following number cards.

She takes a card at random, replaces the card and then takes a second card.
She adds the numbers on the two cards she has taken and records the total.

(a) Complete the following table to show all of her possible totals.

		First card				
	Total	2	2	3	5	6
Second card	2	4	4	5	7	8
	2	4	4	5	7	8
	3	5	5	6	8	9
	5	7	7	8	10	11
	6	8	8	9	11	12

[1]

(b) Find the probability that her total is

(i) an even number,

(b)(i) $\frac{13}{25}$ **[2]**

(ii) a multiple of 3 or 4.

(ii) $\frac{14}{25}$ **[2]**

3. A clock chimes every 20 minutes.
A light flashes every 8 minutes.
The clock chimes and the light flashes together at 08:00.

How many times between 08:01 and 12:30 will the clock chime and the light flash together?
Show your working.

$4 \overline{)\, 8 \quad 20}$

$2 \quad 5$

$= 4 \times 2 \times 5 = 40$

8:00
+40
8:40 ←
+40
9:20 ←
+40
10:00 ←
+40
10:40 ←
+40
11:20 ←
+40
12:00 ←

6 times ..... [5]

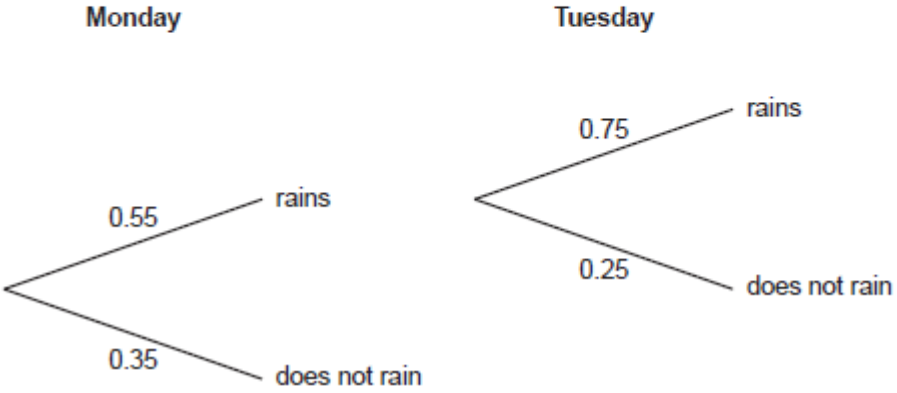
4. A weather forecast says

- the probability that it will rain on Monday is 0.55

and

- the probability that it will rain on Tuesday is 0.25.

Ella draws a tree diagram to show this information.



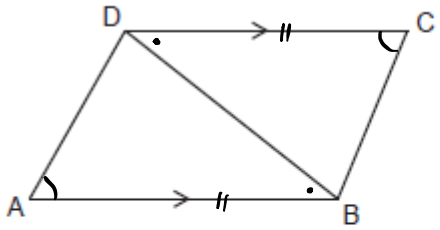
Write down three errors that Ella has made with her tree diagram.

1 The tree diagrams for Monday and for Tuesday are not connected (2 Tuesday tree diagrams following rains and does not rain on Monday)

2 The probabilities for rains and does not rain on Monday do not add up to give 1 (the probability for does not rain should be 0.45)

3 The probability values for Tuesday are swapped around (0.25 is the probability that it will rain on Tuesday) [3]

5. In the diagram, AB and DC are parallel lines of equal length.



Not to scale

Prove that angle DAB = angle BCD.

According to the Z rule, $\angle CDB = \angle DBA$. The $\overline{DB}$ is a side that both $\triangle ABD$ and $\triangle BCD$ have in common. Both $\overline{AB}$ and $\overline{DC}$ are the other side adjacent to the angle ($\angle DBA$ or $\angle CDB$) with equal length. As a result, the $\triangle ABD$ and $\triangle BCD$ are congruent according to SAS rule. [4]

6. **(a)** Work out.

$16^{-\frac{1}{2}} = (16^{\frac{1}{2}})^{-1} = (\sqrt{4^2})^{-1} = 4^{-1} = \boxed{\frac{1}{4}}$

(a) $\frac{1}{4}$ [2]

(b) Simplify.

$\sqrt{6} \times \sqrt{3} = \sqrt{2 \times 3} \times \sqrt{3}$

$= \sqrt{2} \times \sqrt{3} \times \sqrt{3}$

$= \sqrt{2} \times 3$

$= \boxed{3\sqrt{2}}$

(b) $3\sqrt{2}$ [2]

7. The price, £P, of a car is £20000 in 2019.
The price is expected to decrease by 5% each year after 2019.

(a) Jasmine says

This means the price in 2021 is expected to be £18000.

She is incorrect.
Explain her error and work out the correct answer.

2019 : 20 000
2020 : 19 000
2021 : 18050

20 000 × 0.95 = 19000
19 000 × 0.95 = 18050

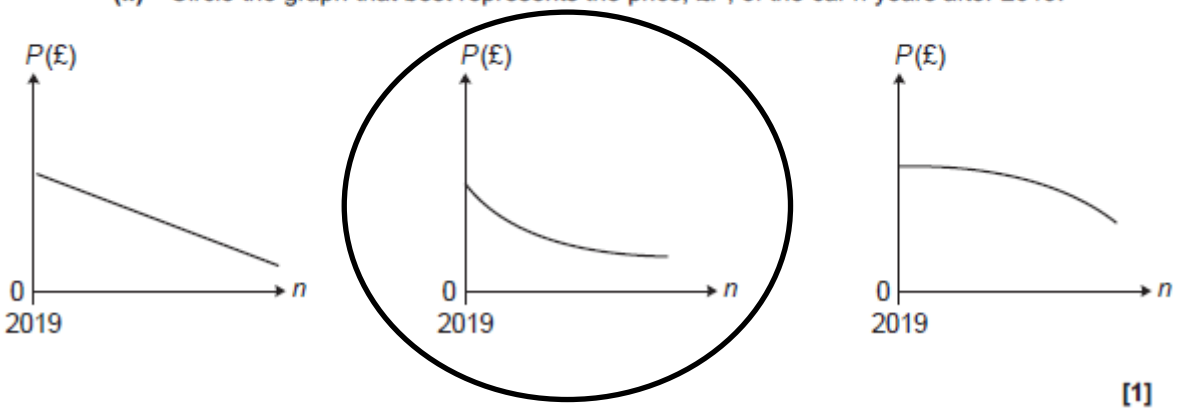
Her error is ....subtracting £1000 (which is 5% of £20000) from £19000 (the price in 2020) instead of subtracting the 5% of £19000

The correct answer is £ ....18050.... **[4]**

(b) **(i)** Write a formula for P in terms of n, where n is the number of years after 2019.

(b)(i) $P =$ ....$20000(1-0.05)^n$.... **[2]**

(ii) Circle the graph that best represents the price, £P, of the car n years after 2019.



[1]

8. Simplify.

(a) $4a^{\frac{1}{2}} \times 3a^2$ $= 12 \times a^{\frac{1}{2}} \times a^2$

$= \boxed{12a^{\frac{5}{2}}}$

(a) $12a^{\frac{5}{2}}$ **[2]**

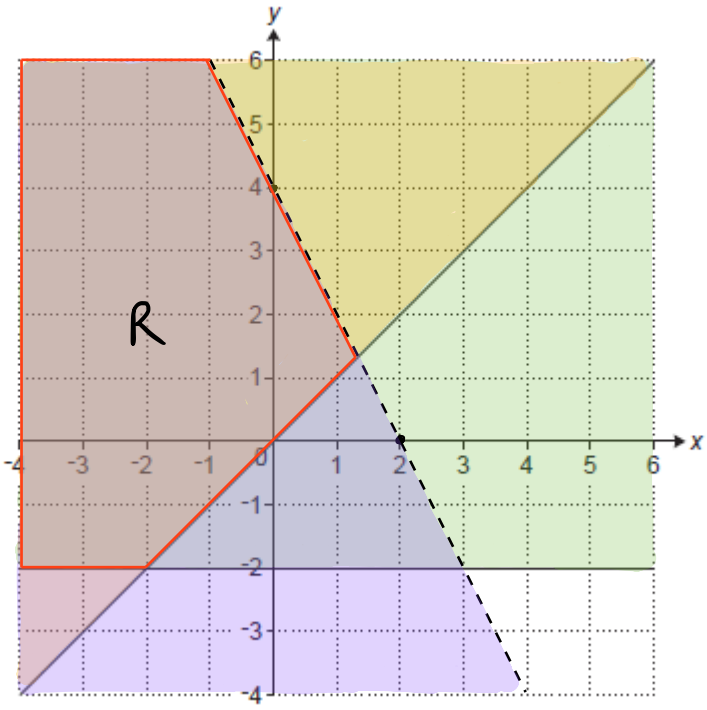
(b) $\left(\frac{2a^2}{a^{-3}}\right)^3$ $= (2a^2 \times a^3)^3$

$= (2a^5)^3$

$= \boxed{8a^{15}}$

(b) $8a^{15}$ **[3]**

9. The graphs of $y = x$ and $y = -2$ are drawn on the grid.



The region R satisfies the following inequalities.

$y \geqslant -2$ $y \leqslant x$ $y < 4 - 2x$

By drawing one more line, find and label the region R. **[5]**

$y = 0 \longrightarrow y \geqslant -2 \quad 0 \geqslant -2$ ✓

$y = 0, x = 1 \longrightarrow y \leqslant x \quad 0 \leqslant 1$ ✓

$y = 0, x = 0 \longrightarrow y < 4 - 2x \quad 0 < 4$ ✓

$y = 0$

$0 = 4 - 2x$

$2x = 4$

$x = 2$

10. ABCD is a trapezium.

Not to scale

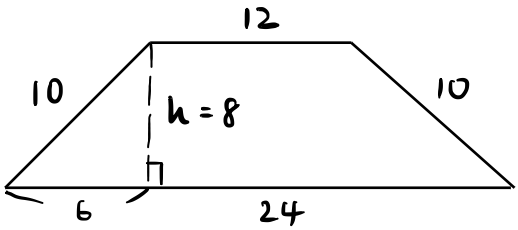
The perimeter of the trapezium is 56 cm.
The ratio AD : AB : DC : BC = 5 : 12 : 6 : 5.

Calculate the area of the trapezium.
Show your working.

$5x + 12x + 5x + 6x = 56$

$28x = 56 \quad (\div 28)$

$x = 2$



$6^2 + h^2 = 10^2$

$h^2 = 100 - 36$

$h^2 = 64$

$h = \sqrt{64} = \sqrt{8^2}$

$h = 8$

trapezium area : $(12+24) \times 8 \times \frac{1}{2}$

$= 36 \times 4$

$= 144$

144 cm^2 [7]

Total Marks for Question Set 5: 50