EQUITY
LEARNING PLACE

WA2 MOCK PAPER 1

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1) Expand and simplify the following expression.

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

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

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

$= 3 - 5x^2 - 20x - 20$

$= -5x^2 - 20x - 17$

Answer: _____ [2]

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2) Factorise the following expressions completely.

a) $12m^2 - 75n^2$

$= 3(4m^2 - 25n^2)$

$= 3(2m+5n)(2m-5n)$

Answer: _____ [2]

b) $3cd - 6ce - d + 2e$

$= 3c(d - 2e) - 1(d - 2e)$

$= (d - 2e)(3c - 1)$

Answer: _____ [2]

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3) Solve the following equation

$$5x + 3 = \frac{4}{x - 1}$$

$(5x+3)(x-1) = 4$

$5x^2 - 2x - 3 = 4$

$5x^2 - 2x - 7 = 0$

$(5x - 7)(x + 1) = 0$

$x = \frac{7}{5}$ or $x = -1$

Answer: _____ [2]

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4) Express the following as a single fraction.

$$\frac{5}{a^2 - a - 6} - \frac{2}{a + 2}$$

$= \frac{5}{(a-3)(a+2)} - \frac{2}{a+2}$

$= \frac{5 - 2(a-3)}{(a-3)(a+2)}$

$= \frac{5 - 2a + 6}{(a-3)(a+2)}$

$= \frac{11 - 2a}{(a-3)(a+2)}$

Answer: _____ [3]

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5) It is given that $sq^2 = r^2 + \frac{1}{2}ps$.

a) Evaluate $q$ when $s = 3$, $r = -5$ and $p = 2.4$.

$3q^2 = (-5)^2 + \frac{1}{2}(2.4)(3)$

$3q^2 = 28.6$

$q^2 = \frac{28.6}{3}$

$q = \pm\sqrt{\frac{28.6}{3}}$

$= \pm 3.09$

Answer: _____ [1]

b) Express $s$ in terms of $p, q$ and $r$.

$2sq^2 = 2r^2 + ps$

$2sq^2 - ps = 2r^2$

$s(2q^2 - p) = 2r^2$

$s = \frac{2r^2}{2q^2 - p}$

Answer: _____ [2]

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6) A box contains 5 identical cards numbered 1, 2, 3, 4 and 5. Two cards are drawn at random, one after another, from the bag without replacement. Find the probability that

a) both cards have an odd number,

$P(\text{both odd}) = \frac{3}{5} \times \frac{2}{4} = \frac{3}{10}$

Answer: _____ [1]

b) at least one of the cards has a prime number.

$P(\text{at least 1 prime})$

$= 1 - P(\text{no prime})$

$= 1 - P(1,4) - P(4,1)$

$= 1 - \frac{1}{5} \times \frac{1}{4} \times 2$

$= \frac{9}{10}$

Answer: _____ [1]

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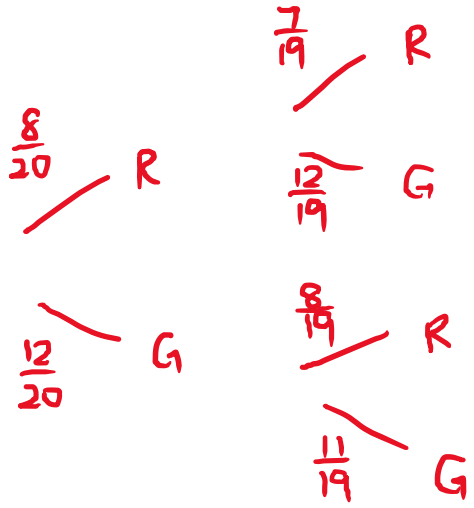
7) A bag contains eight identical red cubes and twelve identical green cubes. Two cubes are selected at random without replacement.

a) Draw a tree diagram to show the probabilities and possible outcomes. [2]

Answer:




b) A game is played by selecting two cubes at random from the bag without replacement.
If two red cubes are selected in the first attempt, 100 points will be awarded.
If one cube of each colour is selected, 75 points will be awarded. Find in fraction, the probability of

a) being awarded with 100 points

$$P(\text{red, red}) = \frac{8}{20} \times \frac{7}{19} = \frac{14}{95}$$

Answer: _____ [1]

b) being awarded 75 points.

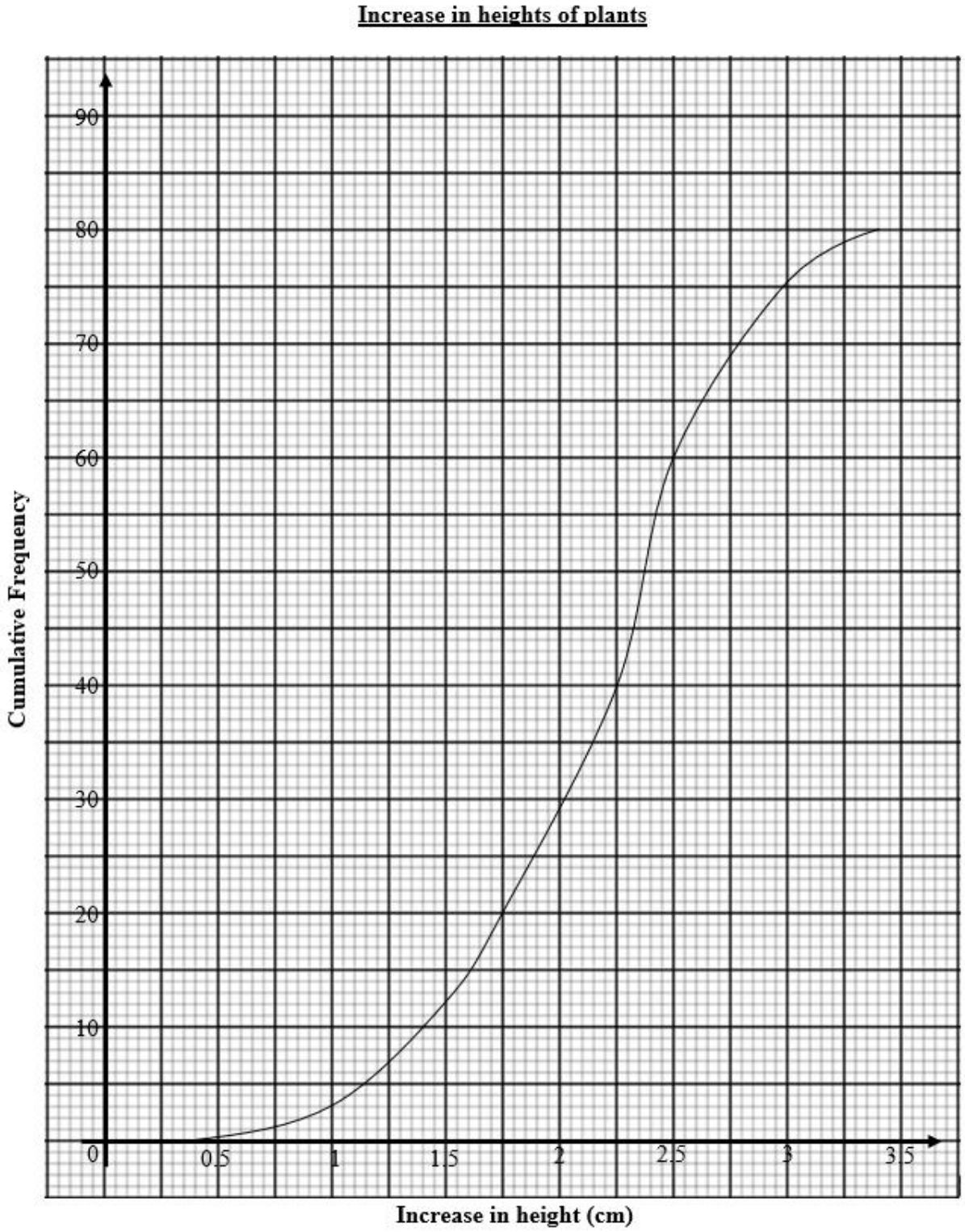
$$P(\text{red, green}) + P(\text{green, red})$$

$$= \frac{8}{20} \times \frac{12}{19} + \frac{12}{20} \times \frac{8}{19}$$

$$= \frac{48}{95}$$

Answer: _____ [2]

8) A scientist wanted to test the effect of different music on the growth of plants. 80 *Rosa chinensis* plants were exposed to Beethoven's Ninth Symphony, and their growth was observed over a period of 10 days. The cumulative frequency curve below shows the increase in the height of the plants at the end of 10 days.



Find

a) the median increase in the height of the plants,

Answer: 2.25 [1]

b) the interquartile range

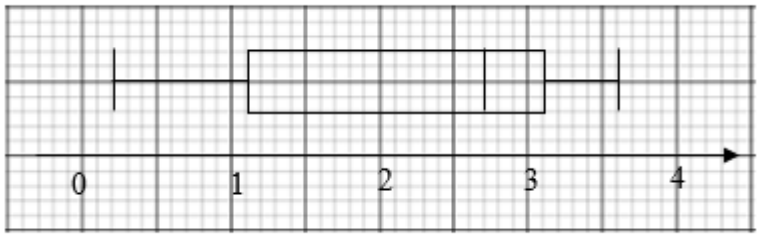
Answer: 0.75 [1]

c) the 90th percentile

$\frac{90}{100} \times 80 = 72$

Answer: 2.875 [1]

d) Another group of 80 *Rosa chinensis* plants were exposed to Bach's Goldberg Variations, and their growth were also observed over a period of 10 days.The box-and-whisker plot below shows the increase in the heights of the plants after 10 days.



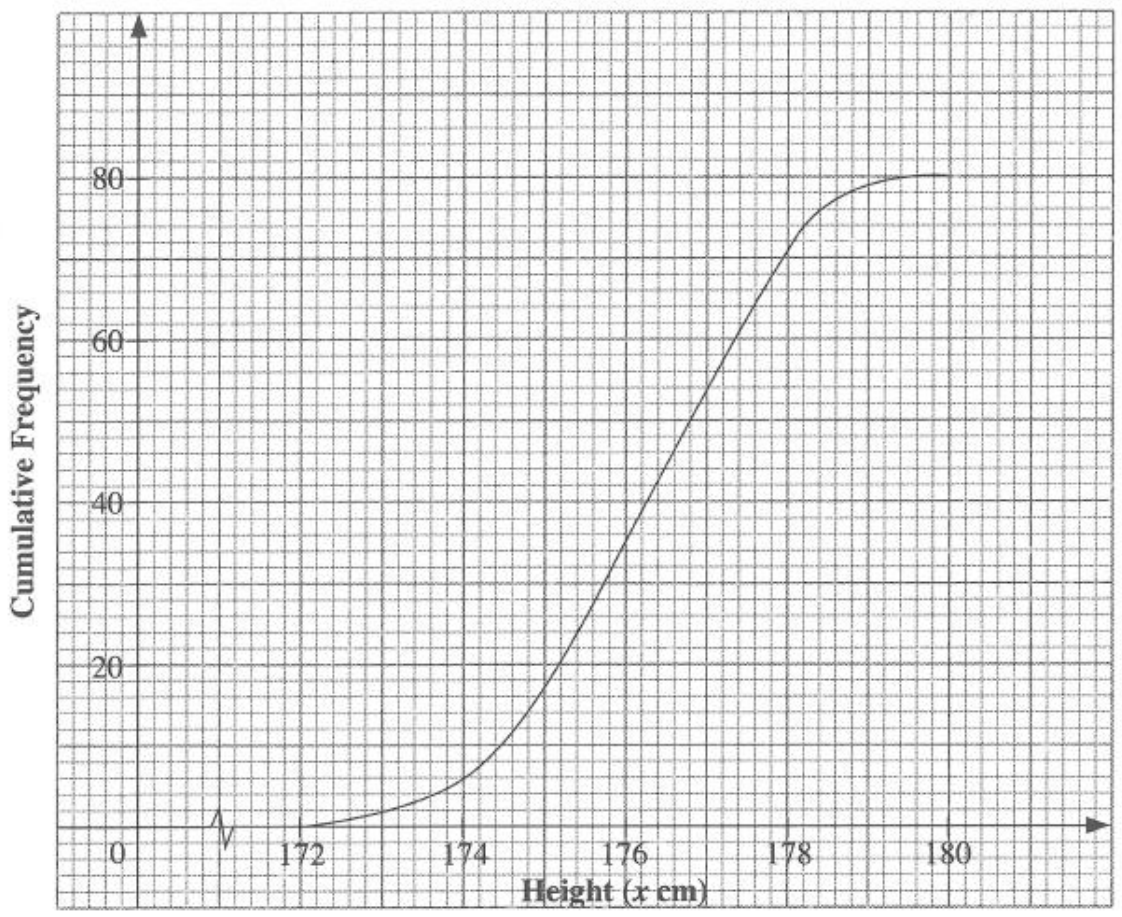

**Increase in height (cm)**

Make two comparisons between the growths of the plants under the two conditions. [2]

Answer:

Plant exposed to Beethoven has a faster growth as the median is higher. The plants exposed to Bach's Goldberg grows in a more consistent manner.

9) The heights of 80 males are shown in the cumulative frequency curve below:




a) Complete the frequency distribution table. [1]

| Height ($x$ cm) | $172 \le x < 174$ | $174 \le x < 176$ | $176 \le x < 178$ | $178 \le x < 180$ |
|---|---|---|---|---|
| Number of Males | 6 | 29 | 36 | 9 |

Calculate an estimate for

b) the mean height.

Answer: 176·2 cm [1]

c) the standard deviation of their heights.

Answer: 1·59cm [1]

d) Using the cumulative frequency graph, estimate the number of males who are at least 176.6 cm tall.

80 - 46 = 34

Answer: _____ [1]

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