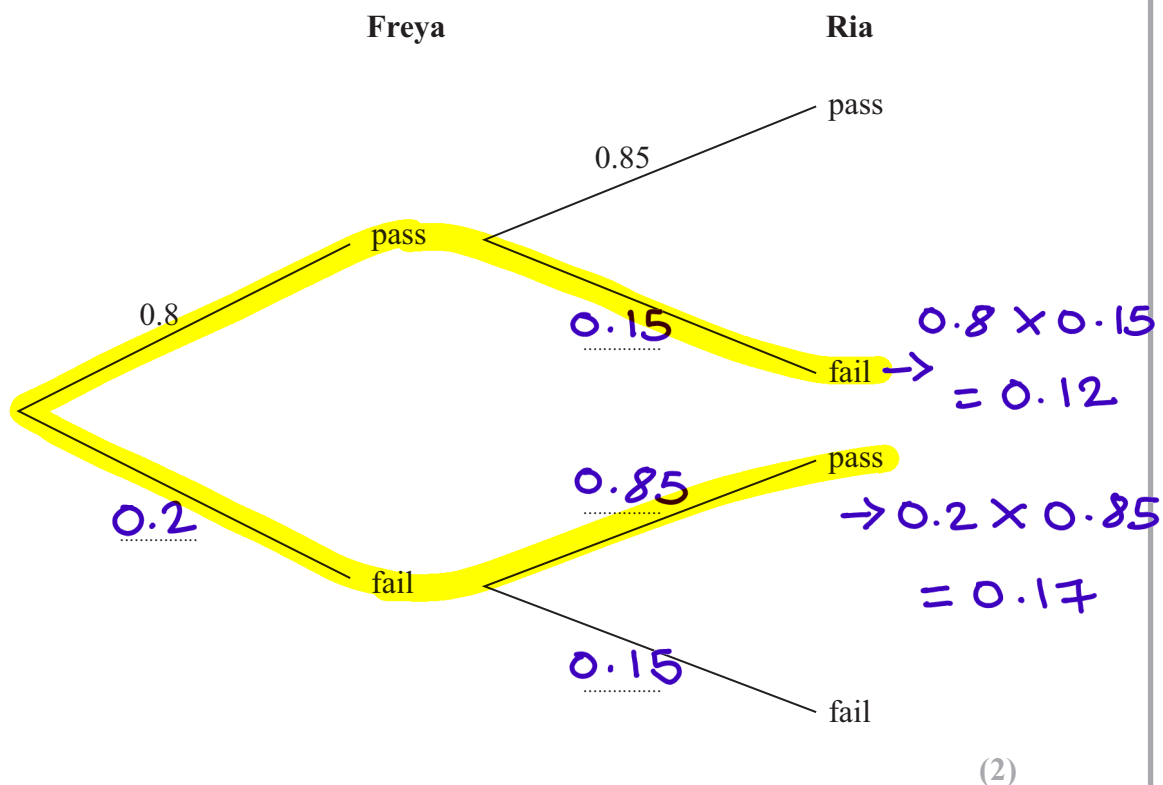


11 Freya and Ria each do an exam.

The probability that Freya will pass the exam is 0.8

The probability that Ria will pass the exam is 0.85

(a) Complete the probability tree diagram.



(b) Work out the probability that only one of Freya or Ria will pass the exam.

$$= 0.12 + 0.17$$

$$= 0.29$$

(3)

(Total for Question 11 is 5 marks)



- 14 There are 15 dogs in a dog show.
One dog is awarded first prize.
A different dog is awarded second prize.

There are 12 cats in a cat show.
One cat is awarded first prize.
A different cat is awarded second prize.

Work out how many different ways these four prizes can be awarded.

$$\frac{15}{D_1} \times \frac{14}{D_2} \times \frac{12}{C_1} \times \frac{11}{C_2} = 27,720$$

(Total for Question 14 is 3 marks)



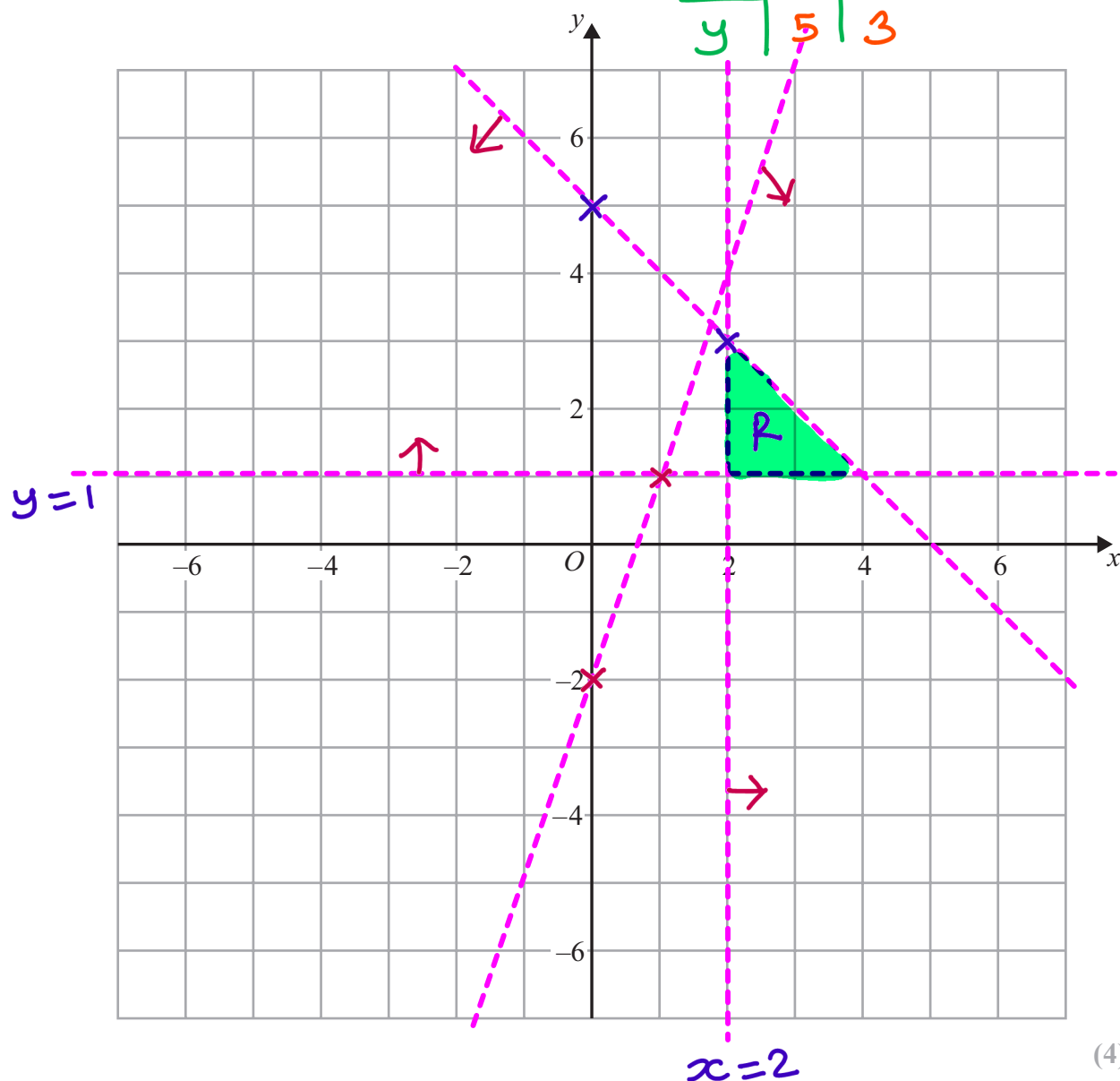
15 (a) On the grid, show by shading, the region that satisfies all of these inequalities.

$$x + y < 5 \quad y > 1 \quad x > 2 \quad y < 3x - 2$$

Label the region **R**.

$$y < -x + 5 \rightarrow \begin{array}{c|c|c} x & 0 & 2 \\ \hline y & 5 & 3 \end{array}$$

$$\begin{array}{c|c|c} x & 0 & 1 \\ \hline y & -2 & 1 \end{array}$$



(4)

Ron says,

“I can remove one of the four inequalities from the grid so that the region **R** will not change.”

Ron is correct.

(b) Which inequality can be removed so that the region **R** will not change?

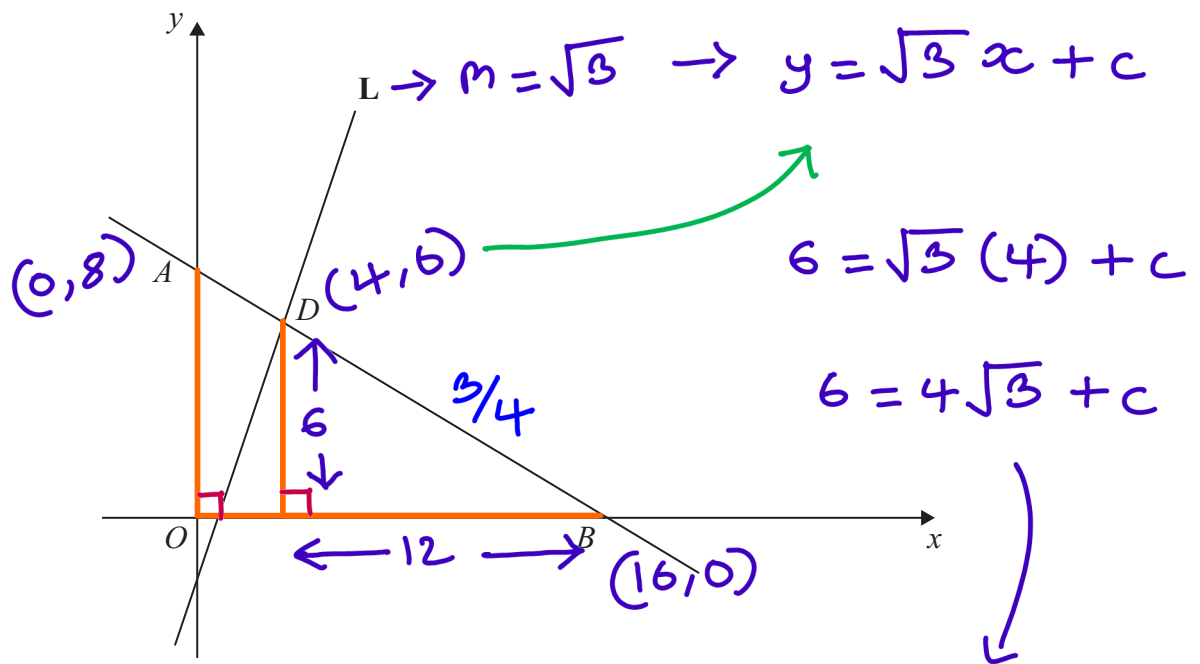
$$y < 3x - 2$$

(1)

(Total for Question 15 is 5 marks)



20



In the diagram

A is the point $(0, 8)$

B is the point $(16, 0)$

The point D divides the line segment AB in the ratio $1:3$

The line L passes through D .

The gradient of L is $\sqrt{3}$

L passes through the point with coordinates $(-2, f)$

Show that $f < -4$

$$L: y = \sqrt{3}x + 6 - 4\sqrt{3}$$

$$= -2\sqrt{3} + 6 - 4\sqrt{3}$$

$$= 6 - 6\sqrt{3}$$

$$f = -4.392\dots$$

(Total for Question 20 is 5 marks)



* F , G and H have positive values.

F is directly proportional to the square root of G
When $F = 1$, $G = 0.16$

$$\rightarrow F = k\sqrt{G}$$

G is inversely proportional to the cube of H
When $G = 1000$, $H = 0.2$

$$1 = k\sqrt{0.16}$$

$$1 = 0.4k$$

$$k = \frac{1}{0.4} = 2.5$$

Work out the value of H when $F = 20$

$$G = \frac{k_2}{H^3}$$

$$1000 = \frac{k_2}{0.2^3}$$

$$k_2 = 8$$

$$F = 2.5\sqrt{G}$$

$$G = \frac{8}{H^3}$$

Linear



Solve the simultaneous equations

$$\begin{aligned} 2y &= 8x + 11 \rightarrow -8x + 2y = 11 \\ 2x + 8y &= 27 \end{aligned}$$

$$2x + 8y = 27 \times 4$$

$$-8x + 2y = 11$$

$$\begin{array}{r} (+) \quad -8x + 2y = 11 \\ \quad 8x + 32y = 108 \\ \hline \end{array}$$

$$34y = 119$$

$$y = \frac{119}{34} = 3.5$$

$$-8x + 2y = 11$$

$$-8x + 7 = 11$$

$$-4 = 8x$$

$$x = -0.5$$

$(-0.5, 3.5) \rightarrow$ point of intersection

* C is a graph with equation $y = x^2 - 5x + 10$

L is a straight line with equation $y = 3x - 6$

Using algebra, find the coordinates of the point of intersection of C and L.
You must show all your working.

$$\cancel{3x} - \cancel{6} = x^2 - 5x + 10$$
$$-3x + 6$$

$$x^2 - 8x + 16 = 0$$

$$(x - 4)(x - 4) = 0$$

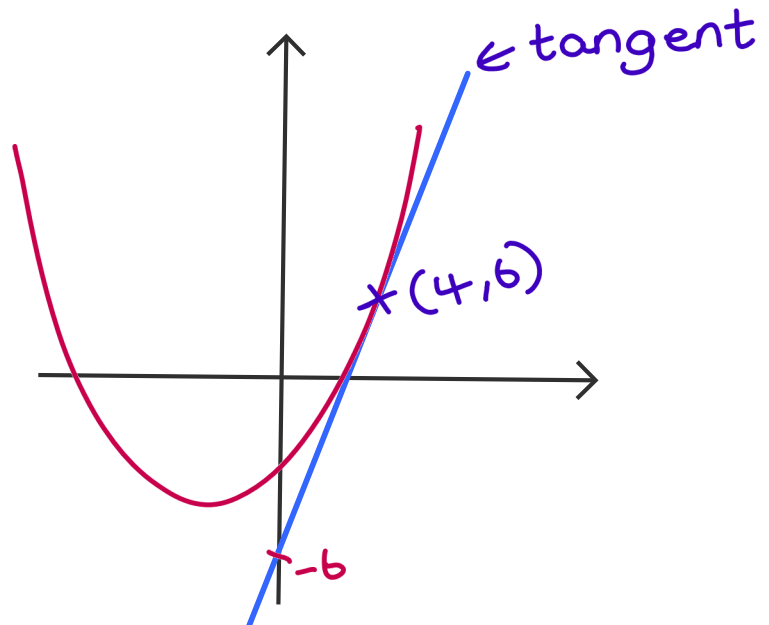
$$x = 4$$

$$y = 3(4) - 6$$

$$y = 6$$

$$(4, 6)$$

$$\begin{array}{cc} & (ac) \\ & 16 \\ -4 & \times & -4 \\ & -8 \\ & (b) \end{array}$$





Solve algebraically the simultaneous equations

$$\begin{aligned}x^2 + y^2 &= 200 \\ y &= 2x - 10\end{aligned}$$

$$x^2 + y^2 = r^2$$

Eq. of circle
with centre
(0,0)

$$x^2 + (2x - 10)^2 = 200$$

$$x^2 + (2x - 10)(2x - 10) = 200$$

$$x^2 + 4x^2 - 40x + 100 = 200$$

$$5x^2 - 40x - 100 = 0$$

$$\cancel{5}(x^2 - 8x - 20) = 0$$

$$\cancel{5} \qquad \qquad \qquad \underline{5}$$

$$x^2 - 8x - 20 = 0$$

$$(x - 10)(x + 2) = 0$$

$$x = 10$$

$$x = -2$$

$$y = 2(10) - 10$$

$$y = 2(-2) - 10$$

$$y = 10$$

$$y = -14$$

$$(10, 10) \text{ and } (-2, -14)$$

$$\begin{array}{cc} & (ac) \\ & -20 \\ -10 & \times & 2 \\ & -8 \\ & (b) \end{array}$$

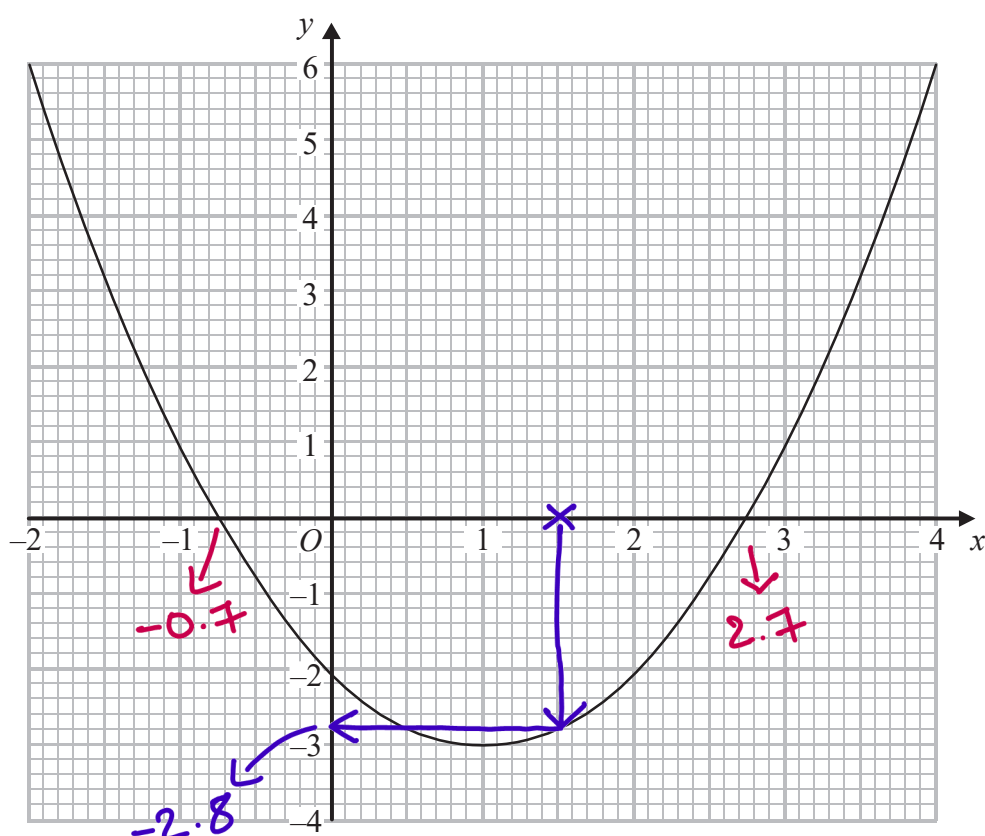


Solve algebraically the simultaneous equations

$$x^2 - 2y^2 = 7$$

$$2y = x + 1 \rightarrow x = 2y - 1$$

11 The graph of $y = f(x)$ is drawn on the grid.



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(a) Write down the coordinates of the turning point of the graph.

(1 , -3)
(1)

(b) Write down estimates for the roots of $f(x) = 0$

$$y = f(x), \quad y = 0$$

(1)

(c) Use the graph to find an estimate for $f(1.5)$

(1)

(Total for Question 11 is 3 marks)

