Towards Excellence.



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- (ii) Explain fully why there are **two values for c**.
- (c) Find all the values of c for which the line y = -x + c will cross the Hyperbola $y = \frac{8}{x}$ at exactly **two points.**
- (d) Find all the values of c for which the line y = -x + c will NOT cross the Hyperbola $y = \frac{8}{x}$ at all.

2. The graph shown has the equation $y = \underline{6} + 6$ If a line y = mx is to be a tangent to $y = \underline{6} + 6$ find *m*.



3. The graph below has the equation $y = \frac{-12}{x} + 9$

If a tangent has a gradient of 2, find the coordinates of the point where the tangent meets the x axis.



Explain clearly why there are TWO answers!



(ii) Explain fully why there are two values for c.

A line with a gradient of 2 can be a tangent to <u>each half</u> of the hyperbola. See diagram above.

(c) Find all the values of c for which the line y = -x + c will cross the Hyperbola $y = \underline{8}$ at exactly two points.

Line will cross twice if there are 2 solutions to $x^2 - cx + 8 = 0$ and this occurs if the discriminant is positive so $c^2 - 4 \times 8 > 0$

$$c > 32$$

so $c < -5.66$ or $c > +5.66$

(d) Find all the values of c for which the line y = -x + c will NOT cross the Hyperbola $y = \underline{8}$ at all.

x

Line will not cross if there are no solutions to $x^2 - cx + 8 = 0$ and this occurs if the discriminant is negative so $c^2 < 32$

$$so - 5.66 < c < +5.66$$

2. The graph shown has the equation $y = \underline{6} + 6$ If a line y = mx is to be a tangent to $y = \underline{6} + 6$ find m. x $mx = \underline{6} + 6$ $mx^{2} = 6 + 6x$ $mx^{2} - 6x - 6 = 0$ there will be only 1 solution if j = 0so 36 - 4m(-6) = 0 24m = -36 $m = -\frac{3}{2}$

3. The graph below has the equation $y = \frac{-12}{x} + 9$

If a tangent has a gradient of 2, find the coordinates of the point where the tangent meets the x axis.



Explain clearly why there are TWO answers! There are <u>two tangents</u> because if the gradient of a line is 2 it can be a tangent to each half of the hyperbola as shown on the diagram. The 2 equations are y = 2x - 0.8 and y = 2x + 18.8These cross the x axis when the y value is 0 ie at x = 0.4 and x = -9.4