5th Year Coordinate Geometry Test Name……………………

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1.) **Find the area of the triangle whose vertices are (2,3), (5,1) and (2,0)**

-2 -3

$(2,3) \rightarrow (0,0)$

$(5,1) \rightarrow (3,-2)$

$(2,0) \rightarrow (0,-3)$

$\frac{1}{2}|-9-0|$

$\frac{1}{2}|9| = 4.5$

$= \frac{9}{2}$

5

2.) The area of the triangle with vertices $(-2, -1)$, $(1, 2)$ and $(k, 13)$ is 6. Find the values of k.

+2 +1

$(-2,-1) \rightarrow (0,0)$

$(1,2) \rightarrow (3,3)$

$(k,13) \rightarrow (k+2,14)$

$\frac{1}{2}|42-3k-6| = 6$

$|\cancel{42} \; 36-3k| = 12$

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$36-3k = 12$

$12 - k = 4$

$k = 8$

$36-3k = -12$

$-3k = -48$

$k = 16.$

3.) (i) Verify that (2, 6) is on the line $x - 2y + 10 = 0$.

(ii) If the line $2x + ky - 12 = 0$ contains the point (3, 2), find the value of k.

(i) $2 - 2(6) + 10 = 0$

$-10 + 10 = 0$ ✓

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(ii) $2(3) + k(2) - 12 = 0$

$2k - 6 = 0$

$k = 3.$

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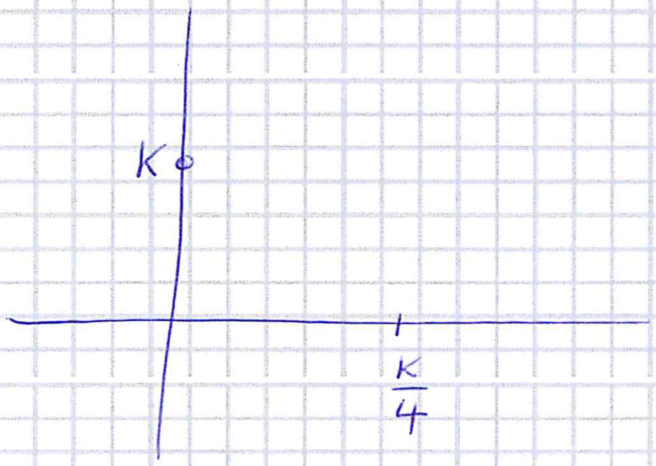
4.) Write down the equation of any line parallel to $\ell: 4x + y = 6$.
Hence find the equation of the line parallel to ℓ which forms a triangle of area 18 square units in the first quadrant.

5 $4x + y = K$ $(0, K)$

$\left(\frac{K}{4}, 0\right)$



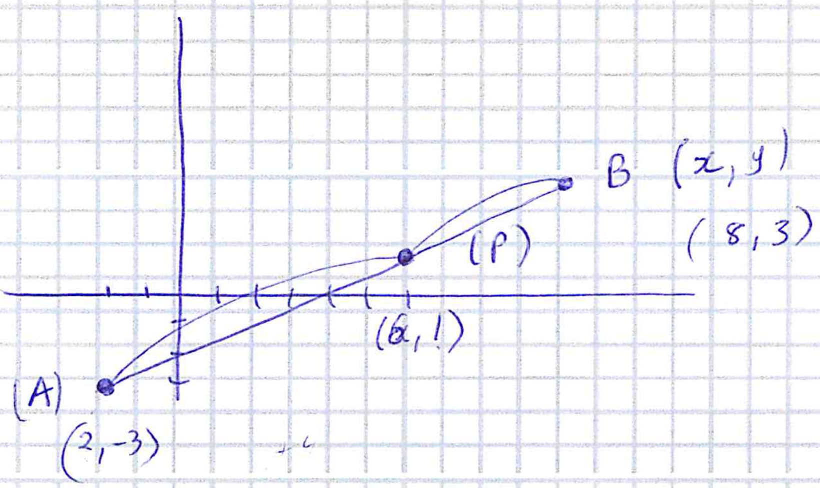
$\frac{1}{2}\left(\frac{K}{4}\right).K = 18$

$K^2 = 144$

$K = \pm 12.$ 10

5 $4x + y = 12$

5.) A(2, −3) and B(x, y) are two points in the plane.
The point P(6, 1) divides [AB] internally in the ratio 2 : 1.
Find the values of x and y.



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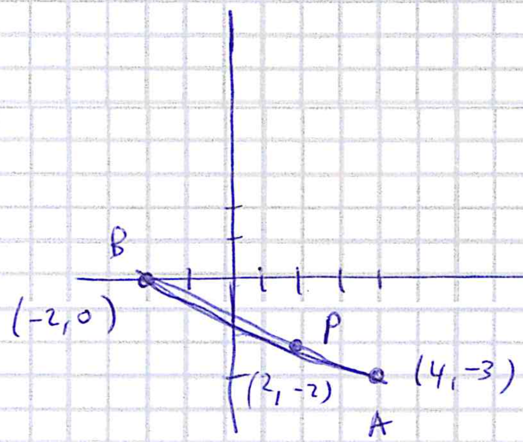
25 +5

6.) A(4, −3) and B(−2, 0) are the end points of a line segment. The point P(2, −2) divides [AB] internally in the ratio $h:k$. Find the ratio $h:k$.



$$(4,-3) \xrightarrow[+1]{-2} (2,-2) \xrightarrow[+2]{-4} (-2,0)$$

1 : 2

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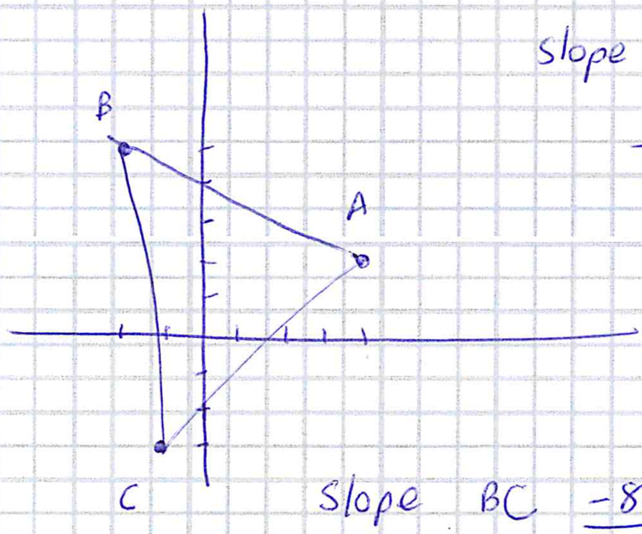
7.) Find the coordinates of the orthocentre of the triangle with vertices A(4, 2), B(−2, 5) and C(−1, −3).



slope AB $\frac{3}{-6} = -\frac{1}{2}$ slope ⊥AB 2

thro (−1, −3)

$y+3 = 2(x+1)$

$\boxed{2x - y = 1}$ 5

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Slope BC $\frac{-8}{1}$ ∴ Slope ⊥BC $= \frac{1}{8}$

thro (4, 2)

$y - 2 = \frac{1}{8}(x-4)$

$8y - 16 = x - 4$

$\boxed{x - 8y = -12}$ 5

$2x - y = 1$

$-2x + 16y = 24$

$15y = 25$

$y = \frac{5}{3}$ $x = 4/3$ 5

ANS: $\left(\frac{4}{3}, \frac{5}{3}\right)$

8.) Verify that the line $3x - y - 4 = 0$ contains the point (2, 2).
Hence find the shortest distance between the parallel lines $3x - y - 4 = 0$ and $6x - 2y + 7 = 0$.

$3(2) - 2 - 4 = 0$

$6 - 2 - 4 = 0$ ✓

5

find distance from $(2,2)$ to $(6x - 2y + 7 = 0)$

$(2, 2)$

$6x - 2y + 7$

$$\frac{|6(2) - 2(2) + 7|}{\sqrt{6^2 + (-2)^2}}$$

$$= \frac{|12 - 4 + 7|}{\sqrt{40}} = \frac{15}{\sqrt{40}} = \frac{3\sqrt{10}}{4}$$

$= 2.372$

10

7.) Show that the points (3, 4) and (9, 3) lie on opposite sides of the line $3x + 4y - 36 = 0$.

$(3, 4)$ $(9, 3)$

$3x + 4y - 36$

$|3(3) + 4(4) - 36|$ $|3(9) + 4(3) - 36|$

$= -11$ 5 $+3$ 5

Since opp signs

$\Rightarrow$ opp sides 5

$\boxed{30}$

8.) Find the obtuse angle between the lines $x - 2y - 1 = 0$ and $3x - y + 2 = 0$.

$m_1 = +\frac{1}{2}$ $m_2 = 3$

$$\tan\theta = \pm \frac{\frac{1}{2} - 3}{1 + 3 \times \frac{1}{2}} = \frac{-\frac{5}{2}}{\frac{5}{2}} = -1$$

$\tan\theta = -1$ or $\tan\theta = 1$

$\theta = 135^\circ$ $\theta = 45^\circ$

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9.) Find the equations of the two lines through the point (4, 2) which make angles of $\tan^{-1}\left(\frac{2}{3}\right)$ with the line $x + y - 2 = 0$. $m_1 = -\frac{1}{1}$

$$\tan\theta = \frac{2}{3} = \pm \frac{m_1 - m_2}{1 + m_1 m_2} = \pm\left(\frac{-1 - m_2}{1 - m_2}\right)$$

$\frac{2}{3} = \frac{-1 - m_2}{1 - m_2}$ 5 $\frac{2}{3} = \frac{+1 + m_2}{1 - m_2}$

$2 - 2m_2 = -3 - 3m_2$ $2 - 2m_2 = 3 + 3m_2$

$m_2 = -5$ $-5m_2 = 1$

$m_2 = -5$ 5 $m_2 = -\frac{1}{5}$

5

$\boxed{30}$

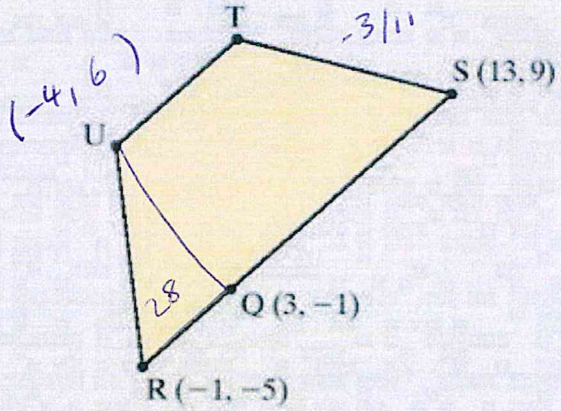
$y - 2 = -5(x - 4)$

$y - 2 = -5x + 20$ $y - 2 = -\frac{1}{5}(x - 4)$

$5x + y - 22 = 0$ 5 $5y - 10 = -x + 4$

$x + 5y - 14 = 0$

10.) RSTU is a quadrilateral where R = $(-1, -5)$ and S = $(13, 9)$.
Q$(3, -1)$ lies on the line RS.



(i) The coordinates of U are $(-2k, 3k)$, where $k \in \mathbb{R}$ and $k > 0$.
The area of the triangle RQU is 28 square units.
Find the value of k.

(ii) The slope of TS is $-\frac{3}{11}$ and SR is parallel to TU.
Find the coordinates of T.

(i) $(-1, -5) \xrightarrow{+1,\ +5} (0, 0)$

$(3, -1) \rightarrow (4, 4)$

$(-2k, 3k) \rightarrow (1-2k, 3k+5)$

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$\frac{1}{2}\left| 12k + 20 - 4(1-2k) \right| = 28$

$\frac{1}{2}\left| 12k+20 - 4 + 8k \right| = 28$

$\left| 20k + 16 \right| = 56$

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$20k+16 = 56$ $\qquad$ $20k + 16 = -56$

$k = 2$ $\qquad$ $k = -72/20$ $\qquad$ $k = 2$

(ii) (x, y) $(13, 9)$ $\qquad$ (x, y) $(-4, 6)$

$\frac{9-y}{13-x} = \frac{-3}{11}$ $\quad$ 5 $\qquad$ $\frac{6-y}{-4-x} = \frac{10}{10} = 1$ $\quad$ 5

$99 - 11y = -39 + 3x$ $\qquad$ $6 - y = -4 - x$ $\quad$ 5

$3x + 11y = 138$ $\qquad$ $x - y = -10$ $\qquad$ T$(2, 12)$

$-3x + 3y = 30$ / $14y = 168$ $\qquad$ $y = 12$, $x = 2$