NAME :

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YEAR 12 – EXT. 1 MATHS

REVIEW TOPIC (SP1)

ANGLE BETWEEN LINES & RATIO FORMULA

CEM – Yr 12 – 3U Division of Lines, Angle Between Lines – Review Paper 1

1. Let A be the point $(-3,8)$ and let B be the point $(5,-6)$. Find the coordinates of the point P that divides the interval AB internally in the ratio $1:3$.

2. Find the obtuse angle between the lines $3x - y + 5 = 0$ and $2x + 3y - 1 = 0$. Give your answer correct to the nearest degree.

CEM – Yr 12 – 3U Division of Lines, Angle Between Lines – Review Paper 1

3. Find the acute angle between the lines $2x - y = 0$ and $x + 3y = 0$ giving the answer correct to the nearest minute.

4. A is the point $(-2,-1)$, B is the point$(1,5)$. Find the coordinates of the point Q which divides AB externally in the ratio 5 : 2.

5. The interval AB, where A is (2,1) and B is (3,2) is divided internally in the ratio 4:3 by the point P(x,y). Find the values of x and y.

6. The point $P(-3,8)$ divides the interval AB externally in the ratio $k:1$. If A is the point $(6,-4)$ and B is the point $(0,4)$, find the value of k.

7. The point P divides the line AB externally in the ratio $3:2$.
Find P if A is (2, -5) and B is (6, 1).

8. The interval AB, where A is (2,1) and B is (3,2) is divided internally in the ratio 4:3 by the point $P(x,y)$. Find the values of x and y.

CEM – Yr 12 – 3U Division of Lines, Angle Between Lines – Review Paper 1

9. Find the acute angle between the lines $3x - y - 2 = 0$ and $x + 2y - 3 = 0$.
Give the answer correct to the nearest degree.

10. Find the coordinates of the point that divides H(-3,4) and K(9,-6) externally in the ratio of 3:5.

CEM – Yr 12 – 3U Division of Lines, Angle Between Lines – Review Paper 1

Answers

1. ① (a) $(-3,8)$ $(5,-6)$ — 1 mark

$1:3$

$m = \frac{3(-3)+1(5)}{1+3}, \frac{3(8)+1(-6)}{1+3}$ ①

$= \left(-\frac{4}{4}, \frac{18}{4}\right)$

$= \left(-1, 4\frac{1}{2}\right)$ ①

2. $3x-y+5=0$ $2x+3y-1=0$

$m_1 = 3$ $m_2 = -\frac{2}{3}$.

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

$\theta = 75$

$\therefore$ obtuse angle $= 105°$

3. $2x-y=0$ $x+3y=0$

$y = 2x \therefore m_1 = 2$ $y = -\frac{x}{3}$ $m_2 = -\frac{1}{3}$

$\tan\theta = \left|\frac{m_1-m_2}{1+m_1m_2}\right|$

$= \left|\frac{2+\frac{1}{3}}{1+2\times-\frac{1}{3}}\right|$

$= \left|\frac{2\frac{1}{3}}{\frac{1}{3}}\right|$

$= 7$

$\therefore \theta = 81°52'$ (to nearest min)

4. $A(-2,-1)$, $B(1,5)$

$m:n$

$5:-2$ $Q\left(\frac{mx_2+nx_1}{m+n}, \frac{my_2+ny_1}{m+n}\right)$

$= \left(\frac{5\times1-2\times-2}{5-2}, \frac{5\times5-2\times-1}{3}\right)$

$= \left(\frac{9}{3}, \frac{27}{3}\right)$

$= (3, 9)$

5. $x = \frac{nx_1+mx_2}{m+n}$ $y = \frac{ny_1+my_2}{m+n}$

$x = \left(\frac{3(2)+4(3)}{7}\right)$ $y = \left(\frac{3(1)+4(2)}{7}\right)$

$x = \left(\frac{6+12}{7}\right)$ $y = \left(\frac{3+8}{7}\right)$

$x = \frac{18}{7}$ $y = \frac{11}{7}$

$P\left(\frac{18}{7}, \frac{11}{7}\right)$ ②

6. The coordinates of P are given by

$x_p = \frac{kx_2+lx_1}{k+l}$ ✓, $y = \frac{ky_2+ly_1}{k+l}$

$-3 = \frac{k(0)+(-1)(6)}{k+(-1)}$ ✓

$-3 = \frac{-6}{k-1}$

$-3(k-1) = -6$

$-3k+3 = -6$

$-3k = -9$

$\therefore k = 3$ ✓

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7. d) $A(2,-5)$ $B(6,1)$

3:-2

$$\left(\frac{3\times6+-2\times2}{1},\frac{3\times1+-2\times-5}{1}\right)=(14,13)$$

8.

$x = \frac{nx_1+mx_2}{m+n}$ $\quad y = \frac{ny_1+my_2}{m+n}$

$x=\left(\frac{3(2)+4(3)}{7}\right)$ $\quad y=\left(\frac{3(1)+4(2)}{7}\right)$

$x=\left(\frac{6+12}{7}\right)$ $\quad y=\left(\frac{3+8}{7}\right)$

$x=\frac{18}{7}$ $\quad y=\frac{11}{7}$

$P\left(\frac{18}{7},\frac{11}{7}\right)$ (2)

9. $\tan\theta = \left|\frac{m_1-m_2}{1+m_1m_2}\right|$

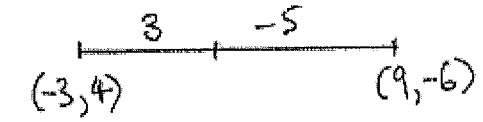
$m_1: -y=-3x+2$ $\quad m_2: 2y=-x+3.$

$y=3x+2.$ $\quad y=-\frac{1}{2}x+\frac{3}{2}.$

$\therefore m=3$ $\quad \therefore m_2=-\frac{1}{2}.$

$\therefore \left|\frac{3+\frac{1}{2}}{1-\frac{3}{2}}\right| = \left|\frac{\frac{7}{2}}{-\frac{1}{2}}\right| = |-7| = 7$

10.



$$\left(\frac{-5\times-3+3\times9}{3+-5},\frac{-5\times4+3\times-6}{3+-5}\right)$$

$(-21, 19)$