SYDNEY GRAMMAR SCHOOL

3I 2011 | Coordinate Geometry | 24th June

1. Find the distance between these points. Answer in surd form.

   (a) $(4, 2)$ and $(7, 2)$

   (b) $(2, 7)$ and $(6, 4)$

   (c) $(-3, 1)$ and $(2, 3)$

   (d) $(-8, -5)$ and $(-2, 1)$

2. Find the midpoint of the interval joining these points.

   (a) $(1, 3)$ and $(5, 11)$

   (b) $(4, 9)$ and $(7, 4)$

   (c) $(-3, 2)$ and $(7, -6)$

   (d) $(-5, 0)$ and $(-2 - 9)$

3. Find the gradient of the line that passes through these points.

   (a) $(1, 4)$ and $(2, 7)$

   (b) $(5, 2)$ and $(11, 4)$

   (c) $(7, 3)$ and $(9, -1)$

   (d) $(4, -1)$ and $(-4, 5)$

4. (a) Find the equation of the line which passes through $(-4, 9)$ and has a gradient of -2.

   (b) Does the point $(8, -15)$ lie on this line?

5. The vertices of $\triangle XYZ$ are $X(1, -5)$, $Y(5, -3)$ and $Z(3, 1)$.

   (a) Show that the triangle is isosceles.

   (b) Show that the triangle is right-angled.

6. The vertices of a quadrilateral are $A(-3, 1)$, $B(2, 9)$, $C(11, 15)$ and $D(6, 7)$.

   (a) Find the midpoint of AC.

   (b) Find the midpoint of BD.

   (c) What kind of quadrilateral is $ABCD$? Why?

7. The line passing through the points $(2, 5)$ and $(-1, c)$ has a gradient of 4. Find the value of c.

8. Consider the points $I(0, -4)$, $J(3, -2)$ and $K(9, 2)$.

   (a) Find the gradient of IJ.

   (b) Find the gradient of JK.

   (c) What can you say about I, J, K? Why?

9. Consider the points $T(-1, 5)$, $U(2, 14)$, $V(-5, -7)$ and $W(-2, 2)$.
   Show that $TU \parallel VW$.

10. Find the equation of the line that has an x-intercept of 5 and a y-intercept of -2.

Coordinate Geometry

①

a.) (4,2) (7,2)

$\sqrt{(7-4)^2+(2-2)^2}$

$\sqrt{9+0}$ ✓

$\sqrt{9}$

3 ✓

b.) (4,9) (7,4)

$\left(\frac{4+7}{2}, \frac{9+4}{2}\right)$

$\left(\frac{11}{2}, \frac{13}{2}\right)$ ✓

(5½, 6½) ✓

b.) (2,7) (6,4)

$\sqrt{(4-7)^2+(6-2)^2}$

$= \sqrt{3^2+4^2}$

$= \sqrt{9+16}$ ✗

$= \sqrt{25}$

$= 5$

do not leave out √

c.) (-3,2) (7,-6)

$\left(\frac{7-3}{2}, \frac{-6+2}{2}\right)$

(2, -2)

c.) $\sqrt{(3+1)^2+(2+3)^2}$ Try again

$\sqrt{9+25}$

$\sqrt{31}$ ✗

$\sqrt{31}$

Ans: $\sqrt{29}$

d.) (-5,0) (-2,-9)

$\left(\frac{-5+-2}{2}, \frac{0-9}{2}\right)$

$\left(\frac{-7}{2}, -9/2\right)$ ✗

$(-3\frac{1}{2}, -4\frac{1}{2})$

d.) $\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$ Try again

$\sqrt{(1+8)^2+(-2-5)^2}$

$9^2 + -7^2$

$81 + -49$ ✗

32

$\sqrt{32}$

Ans: $6\sqrt{2}$

③

a.) $m = \frac{7-4}{2-1} = \frac{3}{1}$ ✓

$= 3$ ✓

②

a.) $\left(\frac{1+5}{2}, \frac{3+11}{2}\right)$

$\left(\frac{6}{2}, \frac{14}{2}\right)$

(3,7) ✓

b.) $m = \frac{4-2}{11-5} = \frac{2}{6}$ ✓

$= 1/3$ ✓

c.) $m = \frac{-1-3}{9-7} = \frac{-4}{2}$

-2 ✗

d.) (4,-1) (-9,5)

$m = \frac{5+1}{-4-4} = \frac{6}{-8}$

$-3/4$

be careful!!!

⑥

a.) A(-3,1) B(11,15)

$\left(\frac{-3+11}{2}, \frac{1+15}{2}\right)$

$\left(\frac{8}{2}, \frac{16}{2}\right)$

$\left(\frac{4}{1}, \frac{8}{1}\right)$ ✓

(4, 8) ✓

④

a.) $y-9 = -2(x+4)$ ✓

$y-9 = -2x-8$

$y = -2x+1$ ✓

b.) (2,9) (6,7)

$\left(\frac{2+6}{2}, \frac{9+7}{2}\right)$

$\left(\frac{8}{2}, \frac{16}{2}\right)$

(4, 8) ✓

b.) $8-9 = -2x-15+1$ ✗

$-1 = 30+1$ ✗

Sub. $x = 8$

$y = -2 \times 8 + 1$

$= -16+1$

$= -15$

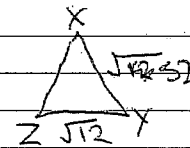
NO, it doesn't lie on the line

Yes, it's on the line

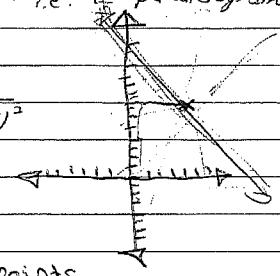
Diagonals bisect each other i.e. a parallelogram

⑤

a.)



c.)



Midpoints are the same

a.) (1,-5) (5,-3)

$XY = \sqrt{(5-1)^2+(-3+5)^2}$

$\sqrt{(5-1)^2+(-3+1)^2}$

$16 + -4$ ✗

$\sqrt{16}\sqrt{2}$ Ans: $2\sqrt{5}$

continue

(5,-3) (3,1)

$(3-5)^2 + (1+3)$

$-2^2 + 4^2$

$-4 + 16$

$\sqrt{12}$

$YZ = \sqrt{(5-3)^2+(-3-1)^2}$

continue

Ans: $2\sqrt{5}$ ∴ XY = YZ i.e. isosceles △

X (1,-5) (3,1)

$(3-1)^2 + (1+5)^2$

$2^2 + 6^2$

$\sqrt{38}$

⑥ Show that $m_1 \times m_2 = -1$

Find m_{XY}, m_{YZ} and m_{ZX} ... continue

7. $4 = \frac{c-5}{-1-2}$

$\frac{c-5}{-1-2}$ ✓

$\frac{c-5}{-3} = \frac{4}{1}$ ✓

$c-5 = -12$

$c = -7$ ✓

8

a) $I(0,4)\ (3,-2)$

$m_{IJ} = \frac{-2+4}{3,0} = \frac{2}{3}$

$2/3$

b) $J(3,-2)K(9,2)$

$\frac{2+2}{9-3}$

$\frac{4}{6} = 2/3$ ✓

c) the gradients are the same
they're colinear ✓

9) $(-5,5)(3,14)$

$\frac{14-5}{2+1} \quad \frac{9}{3}$

$m=3$ ✓

$(-5,-7)(-2,2)$

$\frac{2+7}{-2+5} \quad \frac{9}{3}$

$m=3$ ✓

∴ TU∥VW because TU's gradient is equal to VW's gradient ✓

10) $(2,5)(5,0)(0,-2)$

$\frac{-2-0}{0-5}$

$m = 2/5$ ✓

$y = 2/5x - 2$ ✓