High School Mathematics Test 2015

Year 9

Coordinate Geometry

Non Calculator

Skills and Knowledge Assessed:

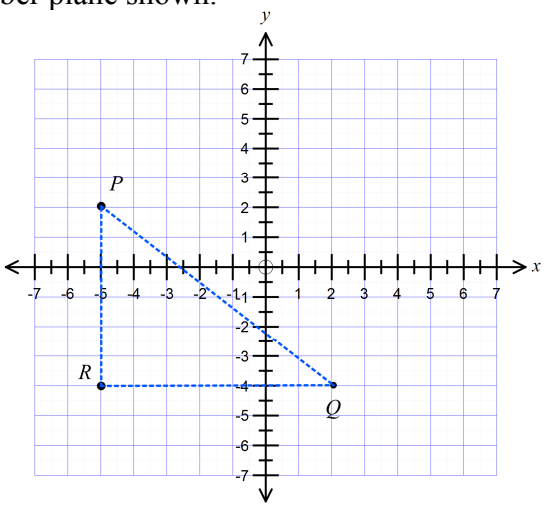
- Find the distance between two points located on a Cartesian plane using a range of strategies, including graphing software (ACMNA214)
- Find the midpoint and gradient of a line segment (interval) on the Cartesian plane using a range of strategies, including graphing software (ACMNA294)

Name_____

Section 1 Short Answer Section

Write all working and answers in the spaces provided on this test paper.

Question 1 – 6 refer to the number plane shown.



1. What are the coordinates of the points *P, Q* and *R*?

   .....

2. Plot and label the points $S(2, 6)$, $T(6, -2)$ and $U(-2, 4)$ on the number plane above.

3. What is the area of the triangle *PQR*?

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   .....

4. What is the midpoint of the interval *ST*?

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5. What is the gradient of the interval SU?

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6. What is the length of the interval TU ?

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7. The points E, F and G are shown on the number plane.
The point H is the fourth vertex of a parallelogram $EFGH$.

What are the coordinates of the point H?

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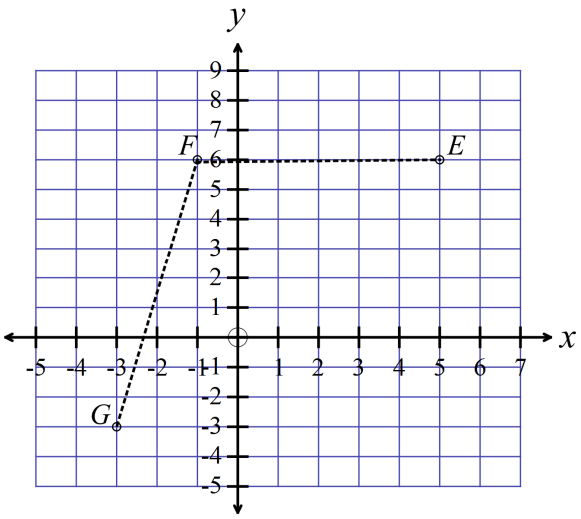

8. What is the midpoint of the interval joining $K\ (-6, 9)$ and $L\ (4, 6)$.

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9. What is the gradient of the line shown?

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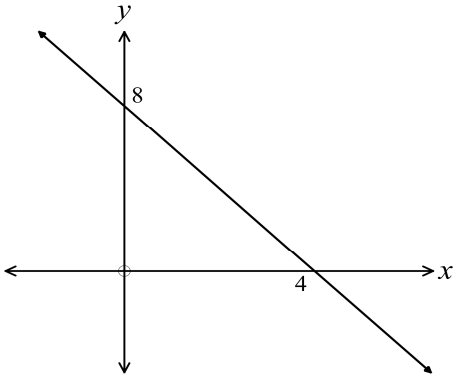

10. What is the length of the interval joining $U\ (-3, -5)$ and $V\ (2, 7)$.

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11. What is the gradient of the line joining $M\ (7, -10)$ and $N\ (3, -2)$?

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12. The interval joining $M\ (m, 9)$ and $N\ (6, n)$ has a midpoint of $(9, 3)$.
What are the values of m and n?

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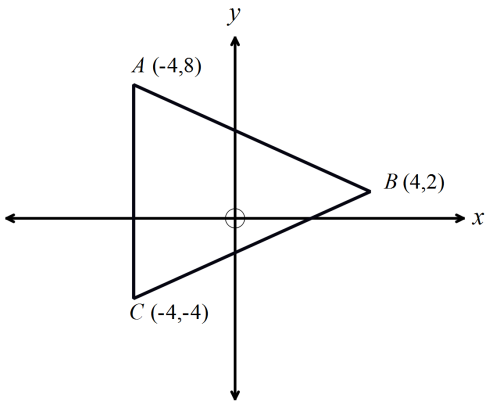
13. Triangle ABC is isosceles, with $AB = BC$.
Find the perimeter of the triangle.



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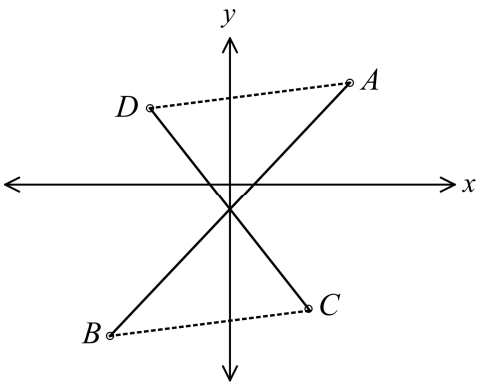
Questions 14 and 15 refer to the diagram below.

The points $A\ (6, 4)$, $B\ (-6, -6)$, $C\ (4, -5)$ and $D\ (-4, 3)$ are shown on the number plane.



14. Show that the interval CD bisects the interval AB.

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15. Show that the interval AD is parallel to the interval CB.

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High School Mathematics Test 2015

Year 9 **Coordinate Geometry**

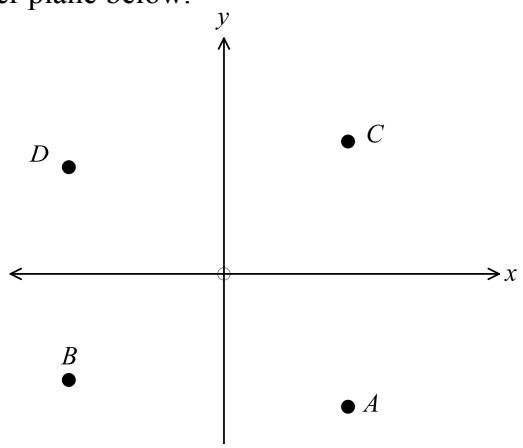
Calculator Allowed

Name_____

Section 2 Multiple Choice Section

Mark all your answers on the accompanying multiple choice answer sheet, not on this test paper. You may do any working out on this test paper. Calculators are allowed for this section.

Questions 1 and 2 refer to the number plane below.



1. Which of the points lies in the 3rd quadrant of the number plane?

   A. Point *A* B. Point *B* C. Point *C* D. Point *D*

2. Which of the points could have coordinates (4, -5)?

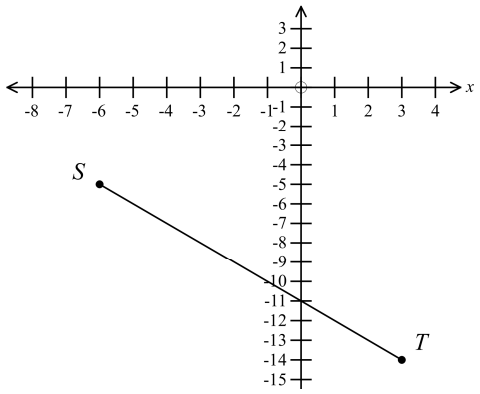
   A. Point *A* B. Point *B* C. Point *C* D. Point *D*

3. What is the midpoint of the interval joining (9, 4) and (5, 0)?

   A. (2, 2) B. (4, 4) C. (7, 2) D. (14, 4)

4. S is the point $(-6, -5)$ and T is the point $(3, -14)$.

What is the gradient of the line ST?



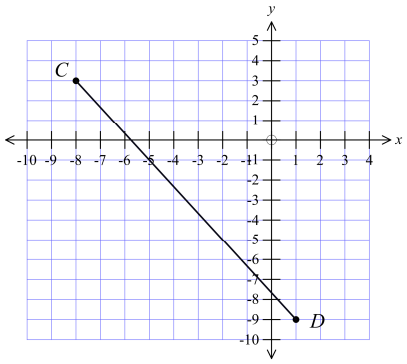
A. -2

B. -1

C. 1

D. 2

5. What is the distance between the points $C(-8, 3)$ and $D(1, -9)$?



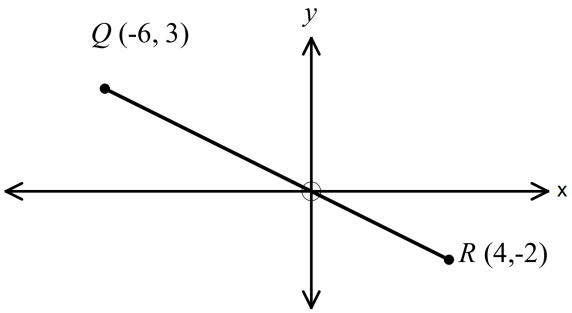
A. 9 cm

B. 12 cm

C. 13 cm

D. 15 cm

Questions 6 – 8 refer to the number plane shown.



6. Find the midpoint of the interval QR.

A. $\left(-5, -2\frac{1}{2}\right)$ B. $\left(-5, \frac{1}{2}\right)$ C. $\left(-1, -2\frac{1}{2}\right)$ D. $\left(-1, \frac{1}{2}\right)$

7. What is the gradient of the interval QR?

A. -2 B. $-\frac{1}{2}$ C. $\frac{1}{2}$ D. 2

8. What is the length of the interval QR?

A. $\sqrt{75}$ units B. $\sqrt{125}$ units C. 12.5 units D. 62.5 units

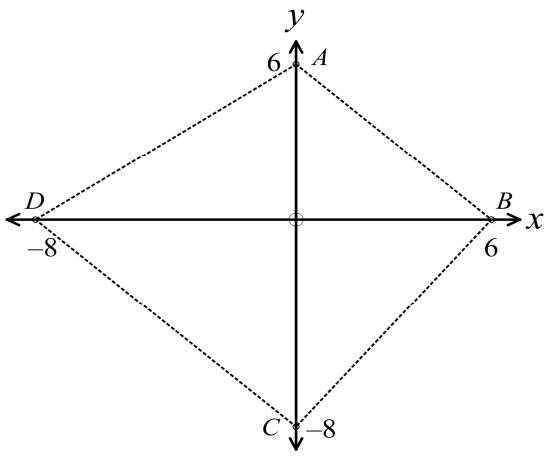
9. Find the gradient of the interval joining $D(3, -1)$ and $E(-3, 2)$.

A. $-1\frac{1}{2}$ B. -1 C. $-\frac{1}{2}$ D. $\frac{1}{2}$

10. Find the length of the interval joining $G(-2, -5)$ and $H(-6, 7)$.

A. 10 units B. $\sqrt{128}$ units C. $\sqrt{160}$ units D. 16 units

11. Which two intervals are the same length?



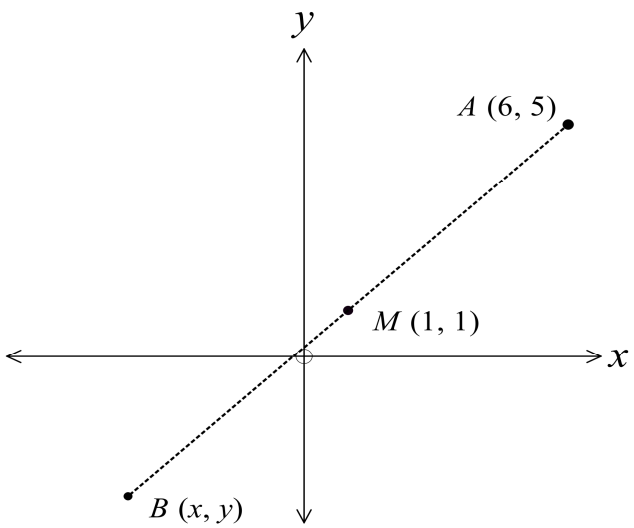
A. AD and BC.

B. AD and DC.

C. AB and DC.

D. BC and DC.

12. M (1, 1) is the midpoint of the interval AB.
D has coordinates (6, 5).
What are the coordinates of B?



A. (–4, –3)

B. (–4, –2)

C. (–3, –3)

D. (–3, –2)

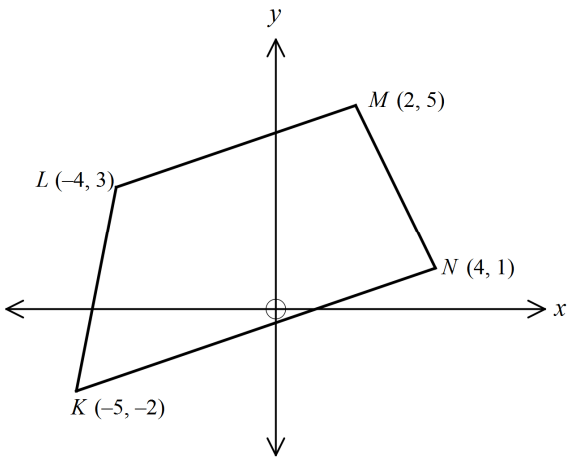
13. Given the points $A(4, 11)$, $B(3, 6)$, $C(6, 12)$, $D(5, 10)$ and $E(7,14)$, which statement is true?

A. Point A bisects the interval DC.
B. Point C bisects the interval BE.
C. Point D bisects the interval BC.
D. Point D bisects the interval BE.

14. The interval LM has a gradient of -6.
If L is the point $(2, -11)$, which of the following could be the coordinates of M?

A. $(-1, 7)$ B. $(0, 2)$ C. $(1, -6)$ D. $(3, -18)$

15. The quadrilateral $KLMN$ has a pair of parallel sides.
What is the gradient of these sides?



A. -2
B. $-\frac{1}{3}$
C. $\frac{1}{3}$
D. 5

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Mathematics Test 2015

Multiple Choice Answer Sheet

Coordinate Geometry

Name _____

Completely fill the response oval representing the most correct answer.

1.	A ⬭	B ⬭	C ⬭	D ⬭
2.	A ⬭	B ⬭	C ⬭	D ⬭
3.	A ⬭	B ⬭	C ⬭	D ⬭
4.	A ⬭	B ⬭	C ⬭	D ⬭
5.	A ⬭	B ⬭	C ⬭	D ⬭
6.	A ⬭	B ⬭	C ⬭	D ⬭
7.	A ⬭	B ⬭	C ⬭	D ⬭
8.	A ⬭	B ⬭	C ⬭	D ⬭
9.	A ⬭	B ⬭	C ⬭	D ⬭
10.	A ⬭	B ⬭	C ⬭	D ⬭
11.	A ⬭	B ⬭	C ⬭	D ⬭
12.	A ⬭	B ⬭	C ⬭	D ⬭
13.	A ⬭	B ⬭	C ⬭	D ⬭
14.	A ⬭	B ⬭	C ⬭	D ⬭
15.	A ⬭	B ⬭	C ⬭	D ⬭

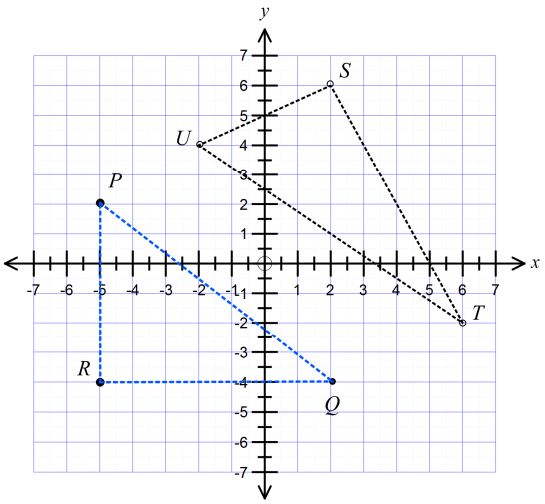
High School Mathematics Test 2015

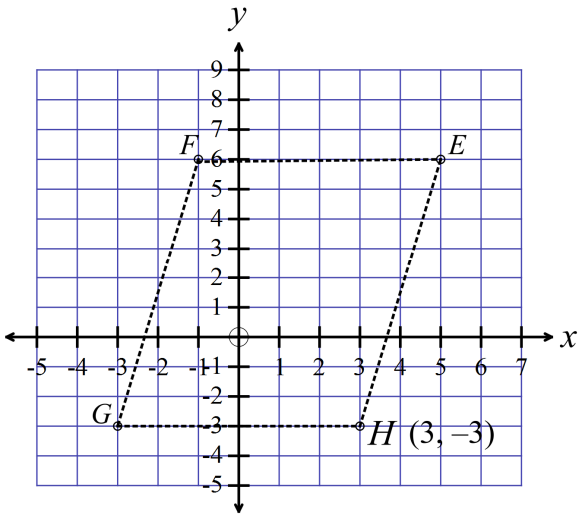
Year 9 Coordinate Geometry

Non Calculator

Section 1 Short Answer Section

ANSWERS

No.	WORKING	ANSWER
1.	$P(-5, 2)$ $Q(2, -4)$ $R(-5, -4)$	$P(-5, 2)$ $Q(2, -4)$ $R(-5, -4)$
2.		Points S, T and U on the graph as shown.
3.	Base RQ = 7 Height PR = 6 Area $= \frac{1}{2} \times 7 \times 6 = 21\ units^2$	21 units^2
4.	$MP_{ST} = \left(\frac{2+6}{2}, \frac{6+-2}{2}\right)$ $= (4, 2)$	(4, 2)
5.	$m_{SU} = \frac{6-4}{2--2}$ $= \frac{2}{4}$ $= \frac{1}{2}$	$\frac{1}{2}$

6.	$d_{TU}{}^2 = 6^2 + 8^2$ $= 36 + 64$ $= 100$ $d_{TU} = \sqrt{100} = 10$	10 units
7.		(3, –3)
8.	Midpoint of $K(-6, 9)$ and L (4, 6). $MP_{KL} = \left(\frac{-6+4}{2}, \frac{9+6}{2}\right)$ $= \left(-\frac{2}{2}, \frac{15}{2}\right)$ $= \left(-1, 7\frac{1}{2}\right)$	$\left(-1, 7\frac{1}{2}\right)$
9.	Gradient $= \frac{Rise}{Run}$ $= -\frac{8}{4}$ $= -2$	–2
10.	Distance from $U(-3, -5)$ to $V(2, 7)$. $d^2 = (2 - -3)^2 + (7 - -5)^2$ $= 5^2 + 12^2$ $= 25 + 144$ $= 169$ $d = \sqrt{169} = 13$	13

11.	Gradient of the line joining $M\ (7, -10)$ and $N\ (3, -2)$? $m = \dfrac{-2 - -10}{3 - 7}$ $= \dfrac{8}{-4}$ $= -2$	-2
12.	$M\ (m, 9)$ and $N\ (6, n)$ has a midpoint of $(9, 3)$. $\dfrac{m+6}{2} = 9$ $\qquad$ $\dfrac{9+n}{2} = 3$ $m + 6 = 18$ $\qquad$ $9 + n = 6$ $m = 12$ $\qquad$ $n = -3$	$m = 12$ $n = -3$
13.	$AB^2 = 8^2 + 6^2$ $= 64 + 36$ $= 100$ $AB = 10$ $BC = AB = 10$ $AC = 12$ Perimeter $= 10 + 10 + 12 = 32$ units	32 units
14.	$MP_{AB} = \left(\dfrac{-6+6}{2}, \dfrac{4+-6}{2}\right)$ $= \left(\dfrac{0}{2}, -\dfrac{2}{2}\right)$ $= (0, -1)$ $MP_{CD} = \left(\dfrac{4+-4}{2}, \dfrac{-5+3}{2}\right)$ $= \left(\dfrac{0}{2}, -\dfrac{2}{2}\right)$ $= (0, -1)$ Since they have the same midpoint, CD bisects AB (*and* vice versa)	Working required to show bisection
15.	$m_{AD} = \dfrac{3-4}{-4-6}$ $\qquad$ $m_{CB} = \dfrac{-6--5}{-6-4}$ $= \dfrac{-1}{-10}$ $\qquad$ $= \dfrac{-1}{-10}$ $= \dfrac{1}{10}$ $\qquad$ $= \dfrac{1}{10}$ Since the gradients are the same, the lines are parallel.	Working required to show parallel lines

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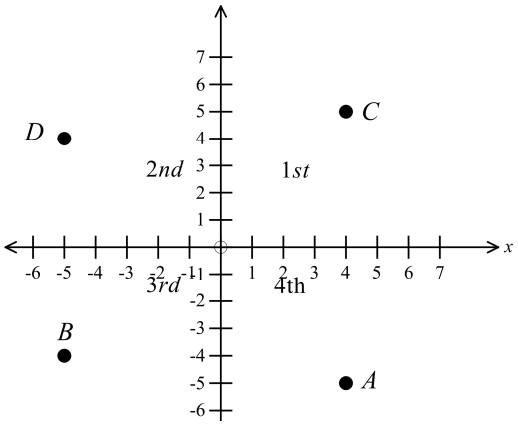
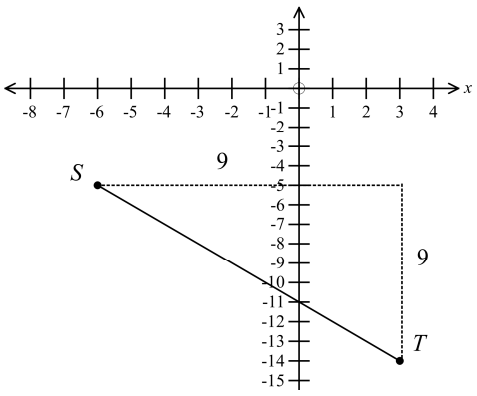
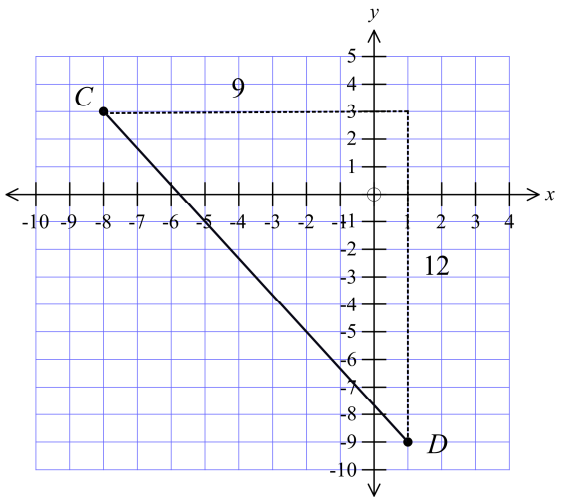
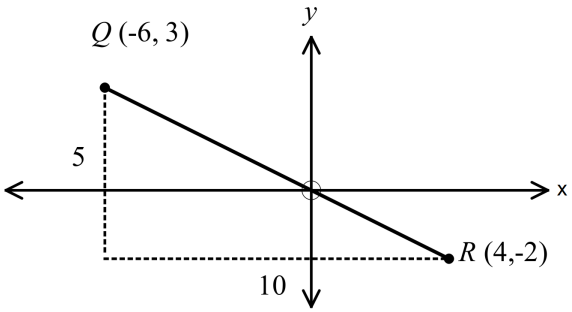
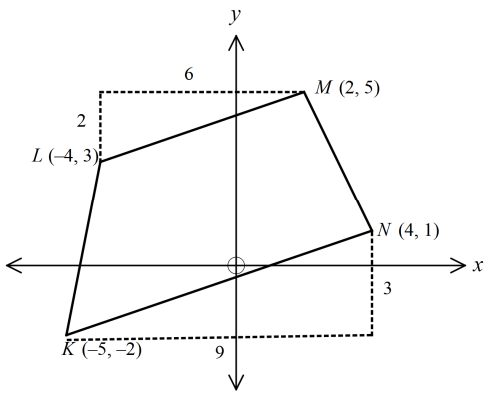
Year 9 **Coordinate Geometry** Calculator Allowed

Section 2 Multiple Choice Section

ANSWERS

No.	WORKING	ANSWER
1.	 B is in 3rd quadrant	**B**
2.	A could have coordinates (4, -5).	**A**
3.	Midpoint of (9, 4) and (5, 0) $MP = \left(\frac{9+5}{2}, \frac{4+0}{2}\right)$ $= \left(\frac{14}{2}, \frac{4}{2}\right)$ $= (7, 2)$	**C**
4.	Gradient $= \frac{Rise}{Run}$ $= \frac{9}{-9}$ $= -1$ 	**B**

5.	 $CD^2 = 9^2 + 12^2$ $= 81 + 144$ $= 225$ $CD = \sqrt{225}$ $= 15$	**D**
6.	$\text{Midpoint} = \left(\frac{-6+4}{2}, \frac{3+-2}{2}\right)$ $= \left(\frac{-2}{2}, \frac{1}{2}\right)$ $= \left(-1, \frac{1}{2}\right)$	**D**
7.	$m = -\frac{5}{10}$ $= -\frac{1}{2}$ 	**B**
8.	$d^2 = 5^2 + 10^2$ $= 25 + 100$ $= 125$ $d = \sqrt{125}$	**B**
9.	$D(6, -7)$ and $E(-3, 2)$. Rise = 2- -1 =2+1 = 3 Run = -3-3 = -6 $\text{Gradient} = \frac{Rise}{Run}$ $= \frac{3}{-6}$ $= -\frac{1}{2}$	**C**

10.	$G(-2, -5)$ and $H(-6, 7)$. Rise = 7- -5 =7+5 = 12 Run = -6- -2 = -6+2 = -4 $d^2 = 12^2 + 4^2$ $= 144 + 16$ $= 160$ $d = \sqrt{160}$	**C**
11.	AD and BC both have $d^2 = 6^2 + 8^2$, so are equal.	**A**
12.	$1 = \frac{x + 6}{2}$ $2 = x + 6$ $x = 2 - 6 = -4$ $1 = \frac{y + 5}{2}$ $2 = y + 5$ $x = 2 - 5 = -3$ B is $(-4, -3)$	**A**
13.	$A(4, 11)$, $B(3, 6)$, $C(6, 12)$, $D(5, 10)$ and $E(7,14)$ MP of $BE = \left(\frac{3 + 7}{2}, \frac{6 + 14}{2}\right) = (5, 10) = D$ so D bisects BE	**D**
14.	Using $(2, -11)$ and $(-1, 7)$ $m = \frac{-11 - 7}{2 - -1} = -\frac{18}{3} = -6$ So $(-1, 7)$ could be M	**A**
15.	 Gradient $LM = \frac{2}{6} = \frac{1}{3}$ Gradient $KN = \frac{3}{9} = \frac{1}{3}$	**C**

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Multiple Choice Answer Sheet

Coordinate Geometry

Name _____ANSWERS_____

9Completely fill the response oval representing the most correct answer.