School Name
Mathematics Test 2017

Year 9 **Coordinate Geometry** Calculator Allowed

Skills and Knowledge Assessed:

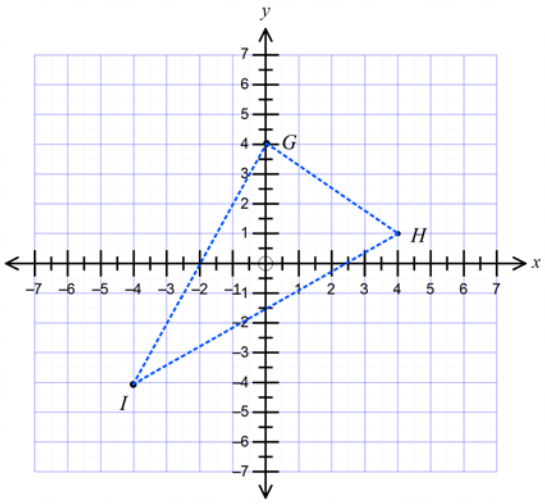
- Find the distance between two points located on a Cartesian plane using a range of strategies, including graphing software (ACMNA214)
- Find the midpoint and gradient of a line segment (interval) on the Cartesian plane using a range of strategies, including graphing software (ACMNA294)

Name_____

Section 1 Short Answer Section

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

Question 1 – 5 refer to the number plane shown.



1. Write down the coordinates of the points *G*, *H* and *I* ?

   …….

2. Plot and label the points $J(3, 5)$, $K(5, -3)$ and $L(-4, 4)$ on the number plane above.

3. What is the distance *GH* ?

   …….

   …….

4. What is the midpoint of the interval HI ?

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5. What is the gradient of the interval GI ?

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6. The points P, Q and R are three vertices of a rhombus.
The point S is the fourth vertex.

What are the coordinates of the point S?

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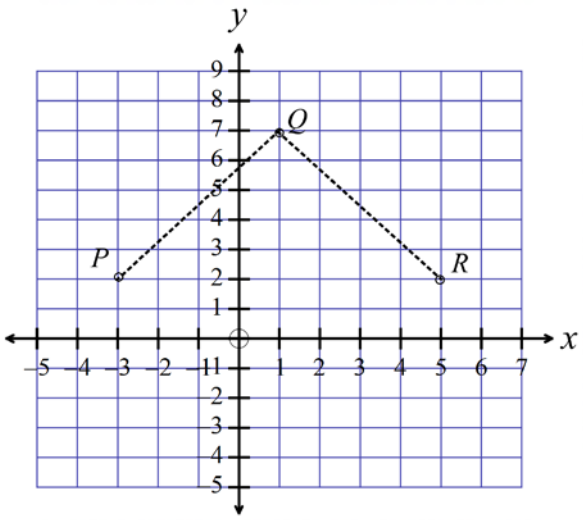

7. What is the midpoint of the interval joining $A\,(6, 4)$ and $B\,(-7, 2)$.

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8. What is the gradient of the line shown?

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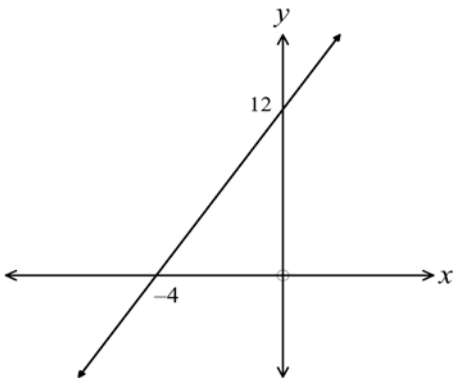

9. What is the length of the interval joining $U\,(-7, -5)$ and $V\,(8, 3)$.

……

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10. What is the gradient of the line joining $W\ (-8, -5)$ and $V\ (-5, 4)$?

……

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11. The interval joining $P\ (7, p)$ and $Q\ (-5, 6)$ has a gradientt of -3.
What is the value of p ?

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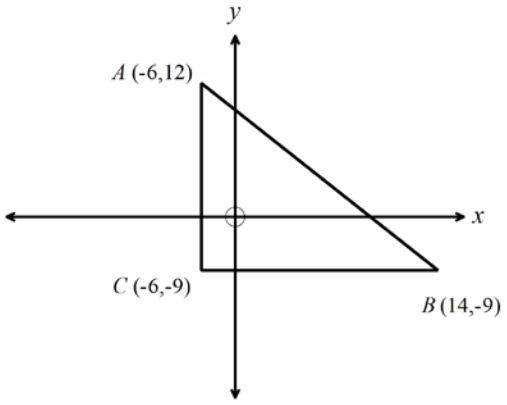
12. ABC is a right triangle on the number plane.
Find the perimeter of the triangle.



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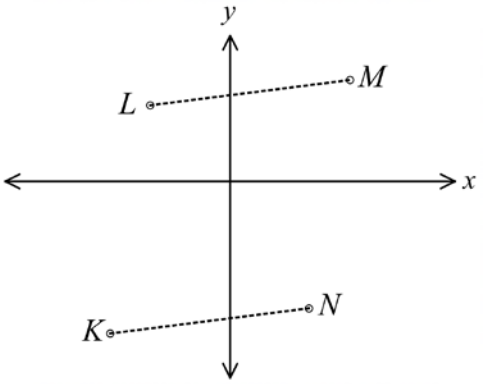
Questions 13 – 15 refer to the diagram below.

The points $K\ (-6, -6)$, $L\ (-4, 3)$, $M\ (6, 5)$ and $N\ (4, -4)$ are shown on the number plane.
The line segments LM and KN are joined.



13. Show that the segment LM is parallel to KN.

……

……

……

14.	The segments *LN* and *KM* are joined. Show that, the segment *LN* bisects *KM*. ……. …….
15.	The segments *LK* and *MN* are joined. Show that, the segments *LK* and *MN* are equal in length. ……. …….

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Year 9 **Coordinate Geometry**

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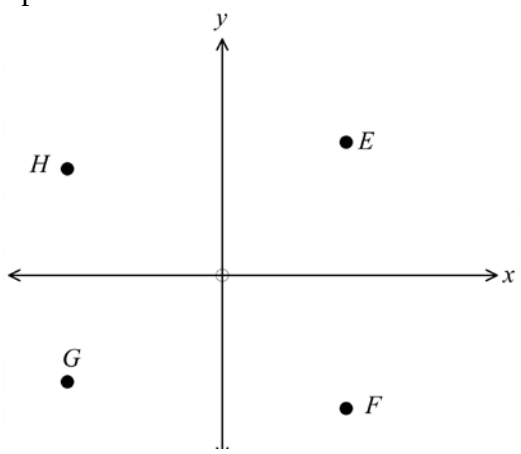
Section 2 Multiple Choice Section

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 4th quadrant of the number plane?

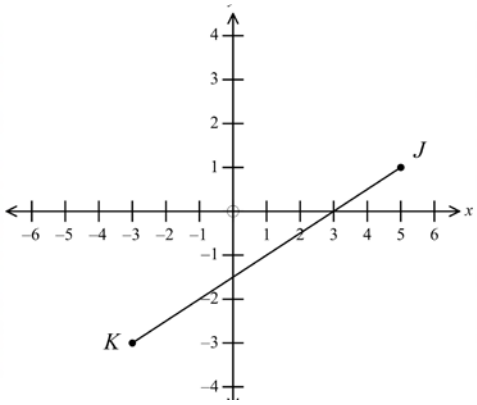
A. Point *E* B. Point *F* C. Point *G* D. Point *H*

2. The gradient of the interval joining two of the points has a gradient of –1.
Which two points were joined?

A. Points *E* and *F* B. Points *E* and *G*
C. Points *E* and *H* D. Points *F* and *H*

3. J is the point $(5, 1)$ and K is the point $(-3, -3)$.

What is the gradient of the line JK?

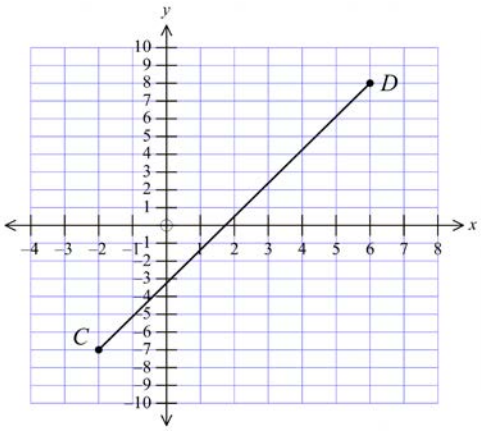


A. -2 B. $-\frac{1}{2}$ C. $\frac{1}{2}$ D. 2

4. What is the midpoint of the interval joining $(6, -1)$ and $(-4, 7)$?

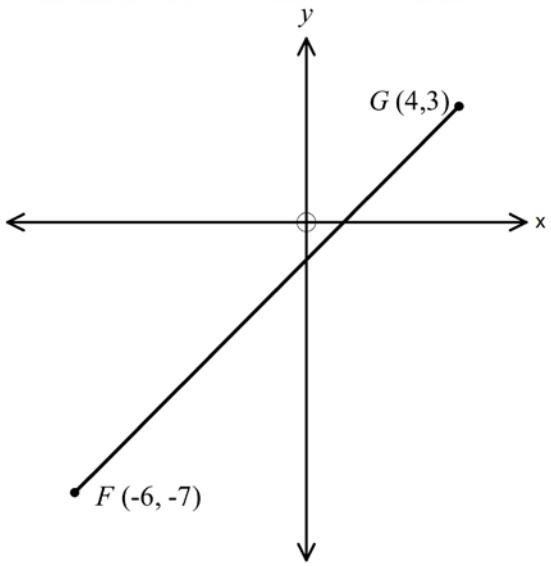
A. $(1, 3)$ B. $(1, -3)$ C. $(-1, 3)$ D. $(5, 4)$

5. What is the distance between the points $C(-2, -7)$ and $D(6, 8)$?



A. 8 units B. 12 units C. 15 units D. 17 units

Questions 6 – 8 refer to the number plane shown.



6. Find the midpoint of the interval FG.

A. $(-5, -5)$ B. $(-1, -5)$ C. $(-1, -2)$ D. $(5, -2)$

7. What is the gradient of the interval FG?

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

8. What is the length of the interval FG ?

A. 10 units B. $\sqrt{200}$ units C. $\sqrt{250}$ units D. $\sqrt{300}$ units

9. Find the gradient of the interval joining $T(-6, 4)$ and $U(-9, -2)$.

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

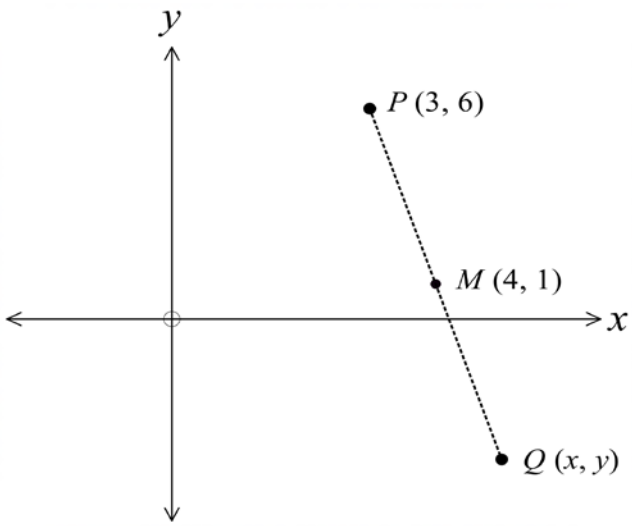
10. Find the length of the interval joining $D(-6, 1)$ and $E(-5, 8)$.

A. $\sqrt{50}$ units B. $\sqrt{82}$ units C. $\sqrt{170}$ units D. $\sqrt{202}$ units

11. The points A (9, –4), B (4, 7) and C (–2, 1) are joined to form a triangle.
Which term could correctly describe the triangle?

A. Equilateral B. Isosceles C. Scalene D. Right Angled

12. The midpoint of the interval *PQ* is the point *M* (4, 1).
P has coordinates (3, 6).
What are the coordinates of B?



A. (–5, –4)

B. (–5, 4)

C. (5, –4)

D. (–4, 5)

13. Given the points $A(4, 1)$, $B(-3, 5)$, $C(-5, 9)$, and $D(9, 1)$, which statement is true?

A. *AB* is parallel to *CD*.
B. *AB* is parallel to *BC*.
C. *AD* is parallel to *BC*.
D. *AD* is parallel to *CD*.

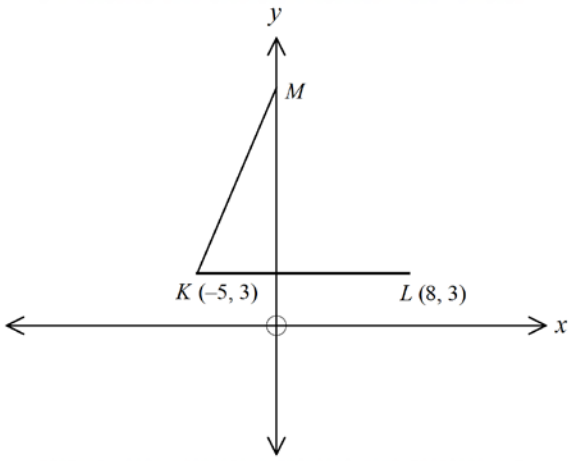
14. The gradient of the interval *PQ* is $-\frac{1}{2}$.
P has coordinates (–4, –6), which of the following could be the coordinates of *Q*?

A. (–8, –8) B. (–8, –6) C. (–8, –5) D. (–8, –4)

15. The points K (–5, 3) and L (8, 3) are shown.

M is the point on the y axis such that $MK = KL$.

What are the coordinates on M?



A. (0, 12)

B. (0, 15)

C. (0, 17)

D. (0, 20)

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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 ⬭

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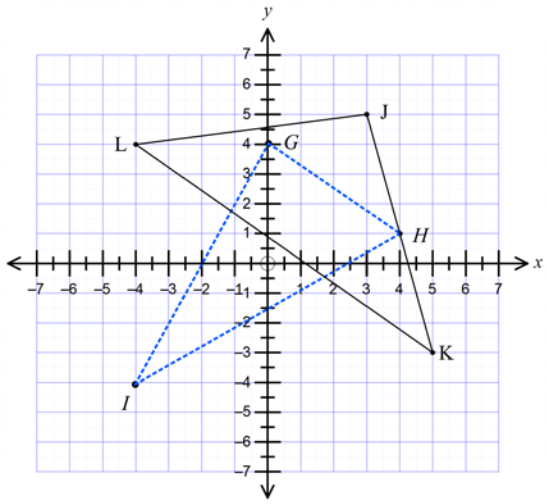
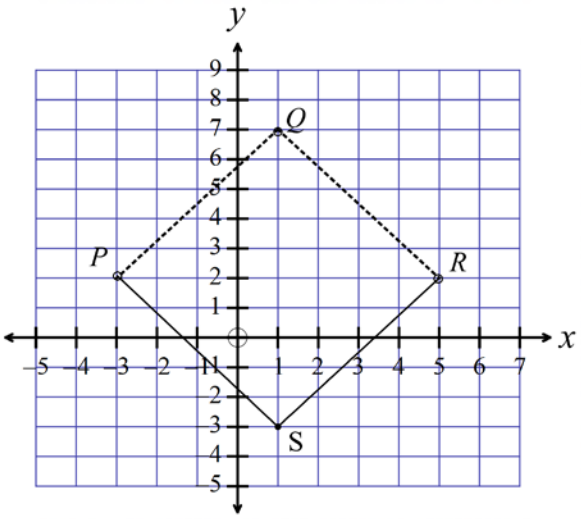
Mathematics Test 2017

Year 9 *Coordinate Geometry* Non Calculator Section

ANSWERS

Question	Working and Answer
1.	$G\ (0, 4)$ $H\ (4, 1)$ $I\ (–4, –4)$
2.	
3.	$GH^2 = 3^2 + 4^2$ $= 25$ $\boldsymbol{GH = \sqrt{25} = 5}$
4.	$MP_{GI} = \left(\frac{4 + -4}{2}, \frac{1 + -4}{2}\right)$ $= \left(\mathbf{0, -1\frac{1}{2}}\right)$

Question	Working and Answer
5.	$m_{GI} = \dfrac{4 - -4}{0 - -4}$ $= \dfrac{8}{4}$ $= \mathbf{2}$
6.	 **S(1, –3)**
7.	Midpoint of $A\,(6, 4)$ and $B\,(-7, 2)$. $MP_{AB} = \left(\dfrac{6 + -7}{2}, \dfrac{4 + 2}{2}\right)$ $= \left(-\dfrac{1}{2}, \dfrac{6}{2}\right)$ $= \left(-\mathbf{\dfrac{1}{2}}, \mathbf{3}\right)$
8.	$\text{Gradient} = \dfrac{Rise}{Run}$ $= \dfrac{12}{4}$ $= \mathbf{3}$

Question	Working and Answer
9.	Distance from $U(-7, -5)$ to $V(8, 3)$. $d^2 = (-7 - 8)^2 + (-5 - 3)^2$ $= -15^2 \pm 8^2$ $= 225 + 64$ $= 289$ $\boldsymbol{d = \sqrt{289} = 17}$
10.	Gradient of the line joining $W(-8, -5)$ and $V(-5, 4)$? $m = \frac{-5 - 4}{-8 - -5}$ $= \frac{-9}{-3}$ $\boldsymbol{= 3}$
11.	$P(7, p)$ and $Q(-5, 6)$ has a gradient of -3. $-3 = \frac{p - 6}{7 - -5}$ $-3 = \frac{p - 6}{12}$ $-36 = p - 6$ $\boldsymbol{p = -36 + 6 = -30}$
12.	$AB^2 = 20^2 + 21^2$ $= 400 + 441$ $= 841$ $AB = \sqrt{841} = 29$ $BC = 20$ and $AC = 21$ Perimeter $= 20 + 21 + 29 =$ **70 units**
13.	$m_{LM} = \frac{5 - 3}{6 - -4}$ $= \frac{2}{10}$ $= \frac{1}{5}$ $m_{KN} = \frac{-4 - -6}{4 - -6}$ $= \frac{2}{10}$ $= \frac{1}{5}$

Question	Working and Answer
14.	$MP_{LN} = \left(\frac{-4+4}{2}, \frac{3+-4}{2}\right) = \left(\frac{0}{2}, -\frac{1}{2}\right) = \left(0, -\frac{1}{2}\right)$ $MP_{KM} = \left(\frac{-6+6}{2}, \frac{-6+5}{2}\right) = \left(\frac{0}{2}, -\frac{1}{2}\right) = \left(0, -\frac{1}{2}\right)$ Since they have the same midpoint, LN bisects KM (and vice versa)
15.	$LK = \sqrt{(-6--4)^2 + (-6-3)^2} = \sqrt{(-2)^2 + (-9)^2} = \sqrt{4+81} = \sqrt{85}$ $MN = \sqrt{(6-4)^2 + (5--4)^2} = \sqrt{(2)^2 + (9)^2} = \sqrt{4+81} = \sqrt{85}$ The line segments are equal in length both being $\sqrt{85}$ units.

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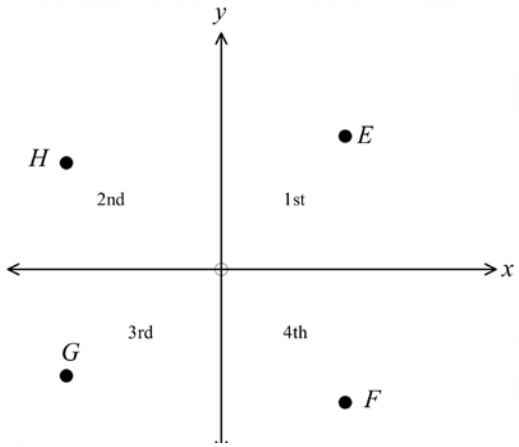
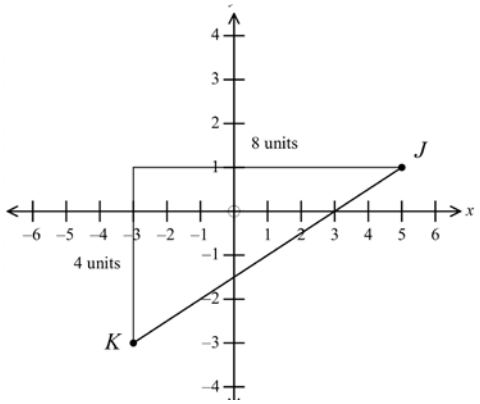
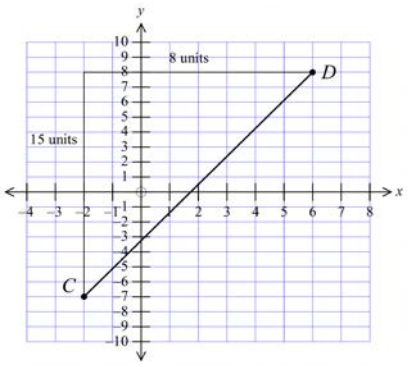
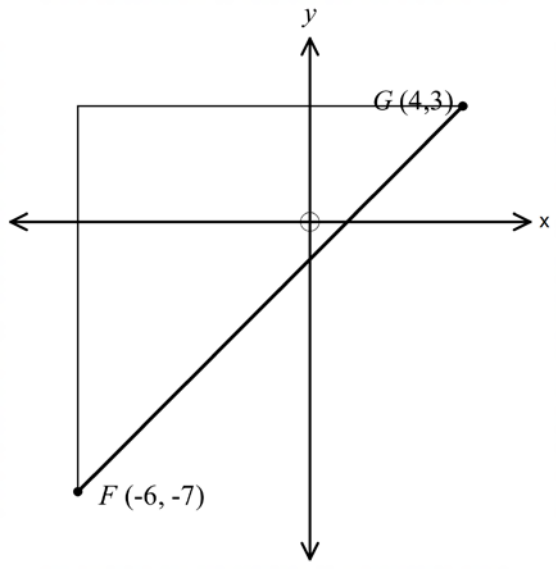
Year 9

Coordinate Geometry

Calculator Allowed
Multiple Choice
Section

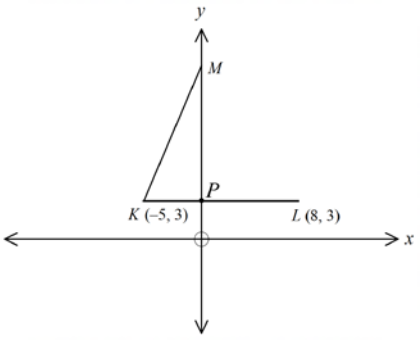
ANSWERS

Question	Working	M C Answer
1.	 F is in 4th quadrant	**B**
2.	*EF* is vertical, *EG* and *EH* have positive gradients, and only *FH* could have a gradient of –1	**D**
3.	$\text{Gradient} = \frac{Rise}{Run}$ $= \frac{4}{8}$ $= \frac{1}{2}$ 	**C**

4.	Midpoint of (6, –1) and (–4, 7)? $MP = \left(\frac{6 + -4}{2}, \frac{-1 + 7}{2}\right)$ $= \left(\frac{2}{2}, \frac{6}{2}\right)$ $= (1, 3)$	**A**
5.	$CD^2 = 8^2 + 15^2$ $= 64 + 225$ $= 289$ $CD = \sqrt{289}$ $= 17$ units 	**D**
6.	Midpoint $= \left(\frac{-6 + 4}{2}, \frac{-7 + 3}{2}\right)$ $= \left(\frac{-2}{2}, \frac{-4}{2}\right)$ $= (-1, -2)$	**C**
7.	$m = \frac{-7 - 3}{-6 - 4}$ $= \frac{-10}{-10}$ $= 1$ 	**D**

8.	$d^2 = 10^2 + 10^2$ $= 100 + 100$ $= 200$ $d = \sqrt{200}$	**B**
9.	$T(-6, 4)$ and $U(-9, -2)$. $\text{Gradient} = \frac{Rise}{Run}$ $= \frac{-2-4}{-9--6}$ $= \frac{-6}{-3}$ $= 2$	**D**
10.	$D(-6, 1)$ and $E(-5, 8)$. $d^2 = (-5--6)^2 + (8-1)^2$ $= 1^2 + 7^2$ $= 1 + 49$ $= 50$ $d = \sqrt{50}$	**A**
11.	$AB^2 = (9-4)^2 + (-4-7)^2$ $= 5^2 + -11^2$ $= 25 + 121$ $= 146$ $AB = \sqrt{146}$ $AC^2 = (9--2)^2 + (-4-1)^2$ $= 11^2 + -5^2$ $= 121 + 25$ $= 146$ $AB = \sqrt{146}$ $BC^2 = (4--2)^2 + (7-1)^2$ $= 6^2 + 6^2$ $= 36 + 36$ $= 72$ $BC = \sqrt{72}$ There are two equal sides, and no right angle (as sum of squares does not obey Pythagoras) only **Isosceles applies.**	**B**

12.	$4 = \frac{x+3}{2}$ $8 = x + 3$ $x = 8 - 3 = -5$ $1 = \frac{y+6}{2}$ $2 = y + 6$ $x = 2 - 6 = -4$ Q is $(5, -4)$	**C**
13.	$A(4, 1)$, $B(-3, 5)$, $C(-5, 9)$, and $D(9, 1)$ $m_{AB} = \frac{5-1}{-3-4}$ $= \frac{4}{-7}$ $m_{BC} = \frac{9-5}{-5--3}$ $= \frac{4}{-2}$ $m_{CD} = \frac{9-1}{-5--9}$ $= \frac{8}{-14}$ $= -\frac{4}{7}$ $m_{AD} = \frac{1-1}{9-4}$ $= 0$ So AB and CD are parallel	**A**
14.	Using $(-4, -6)$ and $m = -\frac{1}{2}$. $-\frac{1}{2} = \frac{y+6}{x+4}$ Test the points given For $(-8, -4)$ $\frac{-4+6}{-8+4} = \frac{2}{-4} = -\frac{1}{2}$ Other points do not give $m = -\frac{1}{2}$. so $(-8, -4)$ could be the point Q	**D**

15.	$LK = 5 + 8 = 13$ units. $\therefore \quad KM = 13$ units Call point where KL intersects the y axis P. $KP = 5$ units Using Pythagoras $MP^2 + KP^2 = KM^2$ $MP^2 = 13^2 - 5^2$ $= 169 - 25$ $= 144$ $MP = \sqrt{144} = 12$ units So $\Omega = 12 + 3 = 15$ units M has coordinates (0, 15) 	**B**

School Name

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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 ○