High School
Mathematics Test 2015

Year 9

Linear Equations

Non Calculator

Skills and Knowledge Assessed:

- Sketch linear graphs using the coordinates of two points and solve linear equations (ACMNA215)
- Substitute values into formulas to determine an unknown (ACMNA234)
- Solve problems involving linear equations, including those derived from formulas (ACMNA235)
- Solve linear inequalities and graph their solutions on a number line (ACMNA236)
- Solve linear equations involving simple algebraic fractions (ACMNA240)

Name_____

Section 1 Short Answer Section

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

1. Solve $3m + 4 = 19$.

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2. Find the value of c if $5c = 28 - 2c$

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3. Solve the equation : $\frac{d}{6} + 9 = 13$.

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4. Solve : $4(a + 3) = 20$.

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5. Use the formula $s = u + at$ to find the value of a when $s = 25$, $u = 7$ and $t = 4$.

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6. Solve $9y - 11 = y + 13$.

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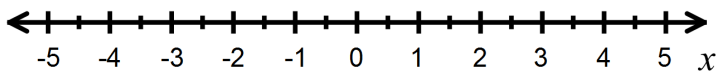
7. Graph the inequality $x \leq -1$ on the number line below.



8. Show how you could check if $y = -3$ is the solution to $12 - 2y = 18$.

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9. Solve $8k - 30 = \frac{k}{2}$.

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10. Solve $3 - \frac{7}{x} = \frac{26}{x}$.

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11. Given the formula $u = a + (n - 1)d$, find the value of d when $u = 61$, $n = 12$ and $a = 6$.

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12. Graph the solution to $3w - 8 \geq 7$

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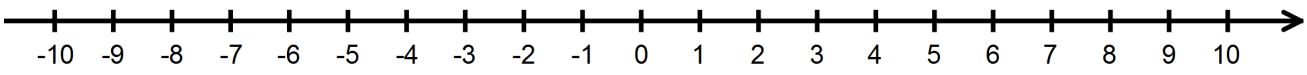


High School
Mathematics Test 2015

Year 9

Linear Equations

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.

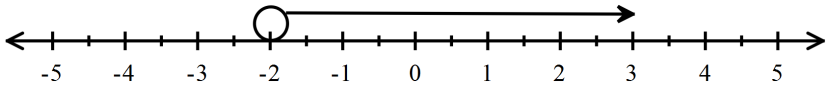
1. Solve $3k - 9 = 15$

A. $k = -2$ B. $k = 2$ C. $k = 4$ D. $k = 8$

2. If $13d = 18 + 4d$, what is the value of d ?

A. $d = 1$ B. $d = 2$ C. $d = 3$ D. $d = 4$

3. Which inequation describes the graph below?



A. $x > -2$ B. $x \geq -2$ C. $x < -2$ D. $x \leq -2$

4. Which is the first incorrect line in the following solution?

$3p - 12 = 20 - 5p$
$3p = 32 - 5p$ ..... Line 1
$3p - 5p = 32$ ..... Line 2
$-2p = 32$ ..... Line 3
$p = \frac{32}{-2} = -16$ ..... Line 4

A. Line 1 B. Line 2 C. Line 3 D. Line 4.

5. Which is the correct solution to the equation :

$$\frac{v + 9}{3} = -15$$

A. $v = -108$ B. $v = -72$ C. $v = -54$ D. $v = -36$

6. The solution to $6(x - 5) \geq 21$ is:

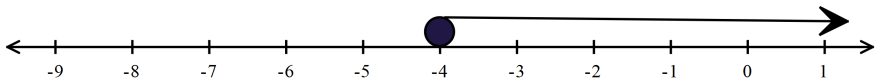
A. $x \geq -1\frac{1}{2}$ B. $x \geq 2\frac{1}{2}$ C. $x \geq 4\frac{1}{3}$ D. $x \geq 8\frac{1}{2}$

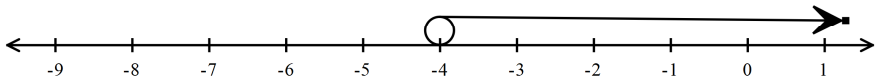
7. Solve for w:

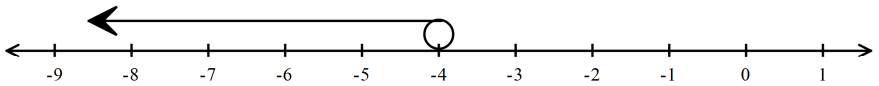
$$\frac{6w}{5} + 9 = 21$$

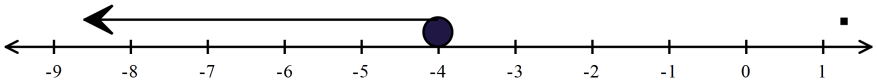
A. $w = 10$ B. $w = 12$ C. $w = 14.4$ D. $w = 25$

8. Which number line graph gives the solution to $\frac{x}{2} + 8 \geq 6$?

A.


B.


C.


D.


9. The formula $s = ut + \frac{at^2}{2}$ is used in physics.

Poppy is asked to find the value of u, if $s = 33$, $t = 3$ and $a = 4$.

What equation should she solve?

A. $3u + 72 = 33$ B. $3u + 18 = 33$

C. $3u + 33 = 72$ D. $3u + 33 = 18$

10. The solution to $7x - 8 \geq 3x + 12$ is:

A. $x \geq 1$ B. $x \geq 2$ C. $x \geq 5$ D. $x \geq 10$

11. Here are four attempts to solve the inequation $\frac{4+12m}{3} > 3m+4$.

Which is correct?

A.
$$\frac{4+12m}{3} > 3m+4$$
$$4+12m > 9m+12$$
$$4-3m > 12$$
$$-3m > 8$$
$$m > -\frac{8}{3}$$
$$m \geq -2\frac{2}{3}$$

B.
$$\frac{4+12m}{3} > 3m+4$$
$$4+12m > 9m+4$$
$$4+3m > 4$$
$$10m > 0$$
$$m > 0$$

C.
$$\frac{4+12m}{3} > 3m+4$$
$$4+12m > 9m+12$$
$$4+3m > 12$$
$$3m > 16$$
$$m > \frac{16}{3}$$
$$m > 5\frac{1}{3}$$

D.
$$\frac{4+12m}{3} > 3m+4$$
$$4+12m > 9m+12$$
$$4+3m > 12$$
$$3m > 8$$
$$m > \frac{8}{3}$$
$$m > 2\frac{2}{3}$$

12. Which of the following is the solution to the equation $\frac{u}{3} - 5 = 2u - 4$?

A. $u = -5\frac{4}{5}$ B. $u = -1\frac{2}{5}$ C. $u = -\frac{3}{5}$ D. $u = 1\frac{2}{5}$

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Year 9

Linear Equations

Calculator Allowed

Name_____

Section 3 Longer Answer Section

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

Marks

1. (a) Solve : $4(m - 3) = 48$ **2**

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(b) Solve : $4k - 11 = 29 - 6k$ **2**

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(c) Solve : $\frac{4y}{3} + 1 = 13$ **2**

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Marks

(d) Use the formula $A = \pi r^2 + \pi rl$ to find the value of A when $\pi = 3.1$, $r = 3$ and $l = 6$. **2**

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2. (a) Solve : $2(3a - 1) = 2a + 14$. **2**

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(b) Solve : $\frac{x}{6} = 12 - \frac{2x}{3}$. **3**

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(c) Solve and graph the solution to $9y - 15 < 5y - 3$. **3**

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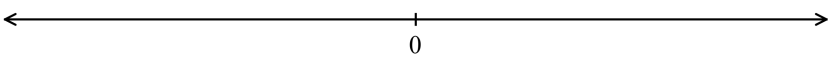

Marks

(d) Use the formula $v^2 = u^2 + 2as$ to find the value of s when $v = 4$, $u = 2$ and $a = 3$ **3**

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3. (a) Solve : $\frac{3a - 9}{5} = 2a + 8$ **3**

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(b) Mike is 4 years older than his brother Leo. The sum of their ages is 28. **3**
Write an equation that describes this situation, using m for Mike's age and solve it to find both of their ages.

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(c) Solve : $c - \frac{8c}{5} = \frac{c + 5}{4}$. **3**

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Marks

(d) Solve : $\frac{2x + 5}{3} \geq 2x - 8$ **3**

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Multiple Choice Answer Sheet

Linear Equations

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 ⬭

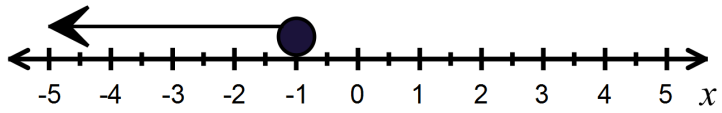
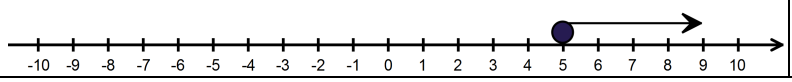
High School Mathematics Test 2015

Year 9 — *Linear Equations* — Non Calculator

Section 1 Short Answer Section

ANSWERS

No.	WORKING	ANSWER
1.	$3m + 4 = 19$ $3m = 15$ $m = 5$	$m = 5$
2.	$5c = 28 - 2c$ $7c = 28$ $c = \frac{28}{7}$ $c = 4$	$c = 4$
3.	$\frac{d}{6} + 9 = 13$ $\frac{d}{6} = 4$ $d = 24$	$d = 24$
4.	$4(a + 3) = 20$ $4a + 12 = 20$ $4a = 8$ $a = 2$	$a = 2$
5.	$s = 25$, $u = 7$ and $t = 4$. $s = u + at$ $25 = 7 + 4a$ $18 = 4a$ $a = \frac{18}{4}$ $= 4\frac{1}{2}$	$a = 4\frac{1}{2}$
6.	$9y - 11 = y + 13$ $9y = y + 24$ $8y = 24$ $y = \frac{24}{8} = 3$	$y = 3$

7.	$x \leq -1$  	See graph
8.	$12 - 2y = 18.$ Sub $y = -3$ $LHS = 12 - 2y$ $= 12 - 2 \times (-3)$ $= 12 + 6$ $= 18$ $= RHS$ So it is a solution.	It is a solution. Need to show working of substitution, for the mark.
9.	$8k - 30 = \frac{k}{2}$ $2 \times 8k - 2 \times 30 = 2 \times \frac{k}{2}$ $16k - 60 = k$ $16k = k + 60$ $15k = 60$ $k = \frac{60}{15} = 4$	$k = 4$
10.	$x \times 3 - x \times \frac{7}{x} = x \times \frac{26}{x}$ $3x - 7 = 26$ $3x = 33$ $x = \frac{33}{3} = 11$	$x = 11$
11.	$u = 61, n = 12$ and $a = 6.$ $u = a + (n-1)d$ $61 = 6 + (12-1)d$ $55 = 11d$ $d = \frac{55}{11} = 5$	$d = 5$
12.	$3w - 8 \geq 7$ $3w \geq 15$ $w \geq 5$  	See graph

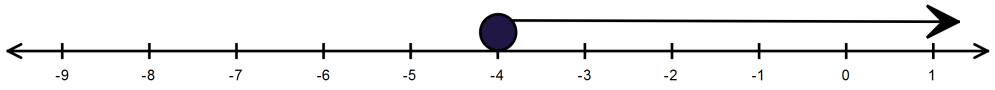
High School Mathematics Test 2015

Year 9 — *Linear Equations* — Calculator Allowed

Section 2 Multiple Choice Section

ANSWERS

No.	WORKING	ANSWER
1.	$3k - 9 = 15$ $3k = 15 + 9$ $3k = 24$ $k = \frac{24}{3} = 8$	**D**
2.	$13d = 18 + 4d$ $9d = 18$ $d = \frac{18}{9}$ $d = 2$	**B**
3.	Open circle so not equal to -2, arrow to right, so greater than -2. $x > -2$	**A**
4.	Line 2 should be $3p + 5p = 32$	**B**
5.	$\frac{v+9}{3} = -15$ $3 \times \frac{v+9}{3} = 3 \times -15$ $v + 9 = -45$ $v = -54$	**C**
6.	$6(x-5) \geq 21$ $6x - 30 \geq 21$ $6x \geq 51$ $x \geq \frac{51}{6}$ $x \geq 8\frac{1}{2}$	**D**
7.	$\frac{6w}{5} + 9 = 21$ $\frac{6w}{5} = 12$ $6w = 60$ $w = 10$	**A**

8.	$\frac{x}{2} + 8 \geq 6$ $\frac{x}{2} \geq -2$ $x \geq -4$  	**A**
9.	$s = ut + \frac{at^2}{2}$ $33 = u \times 3 + \frac{4 \times 3^2}{2}$ $3u + \frac{36}{2} = 33$ $3u + 18 = 33$	**B**
10.	$7x - 8 \geq 3x + 12$ $4x - 8 \geq 12$ $4x \geq 20$ $x \geq 5$	**C**
11.	$\frac{4 + 12m}{3} > 3m + 4$ $4 + 12m > 9m + 12$ $4 + 3m > 12$ $3m > 8$ $m > \frac{8}{3}$ $m > 2\frac{2}{3}$	**D**
12.	$\frac{u}{3} - 5 = 2u - 4$ $u - 5 \times 3 = 2u \times 3 - 4 \times 3$ $u - 15 = 6u - 12$ $-5u - 15 = -12$ $-5u = 3$ $u = -\frac{3}{5}$	**C**

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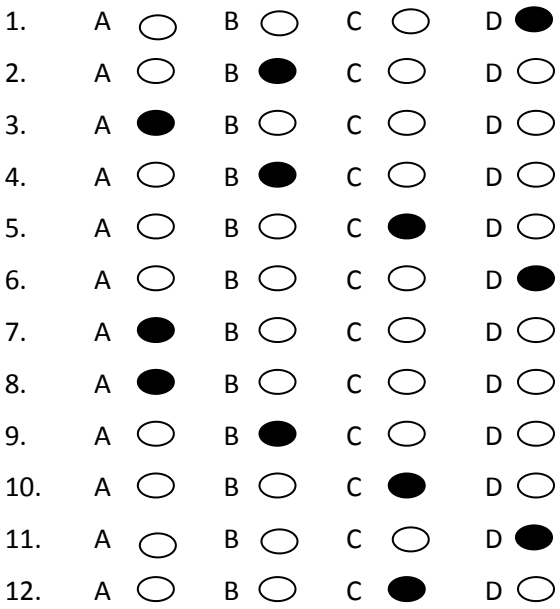
Multiple Choice Answer Sheet

Linear Equations

Name _____ANSWERS_____

Completely fill the response oval representing the most correct answer.



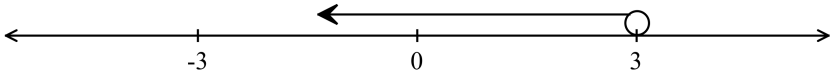
High School
Mathematics Test 2015

Year 9	*Linear Equations*	Calculator Allowed

Section 3 Longer Answer Section

ANSWERS

			Marks
1.	(a)	$4(m-3) = 48$ $4m - 12 = 48$ $4m = 60$ $m = \frac{60}{4} = 15$	**2 marks for correct answer with working.** **1 mark for working with a single error.**
	(b)	$4k - 11 = 29 - 6k$ $4k = 40 - 6k$ $10k = 40$ $k = \frac{40}{10} = 4$	**2 marks for correct answer with working.** **1 mark for working with a single error.**
	(c)	$\frac{4y}{3} + 1 = 13$ $\frac{4y}{3} = 12$ $4y = 36$ $y = \frac{36}{4} = 9$	**2 marks for correct answer with working.** **1 mark for working with a single error.**
	(d)	$A = \pi r^2 + \pi rl$ $= 3{\cdot}1 \times 3^2 + 3{\cdot}1 \times 3 \times 6$ $= 27{\cdot}9 + 55{\cdot}8$ $= 83{\cdot}7$	**2 marks for correct answer with working.** **1 mark for working with a single error.**
2.	(a)	$2(3a - 1) = 2a + 14$ $6a - 2 = 2a + 14$ $6a = 2a + 16$ $4a = 16$ $a = 4$	**2 marks for correct answer with working.** **1 mark for working with a single error.**

	(b) $\frac{x}{6} = 12 - \frac{2x}{3}$ $6 \times \frac{x}{6} = 6 \times 12 - 6 \times \frac{2x}{3}$ $x = 72 - 4x$ $5x = 72$ $x = \frac{72}{5}$ $x = 14\frac{2}{5}$	**3 marks for correct answer with working.** **2 marks for working with a single error in logic or calculation** **1 mark for working with some correct logic.**
	(c) $9y - 15 < 5y - 3$ $4y - 15 < -3$ $4y < 12$ $y < 3$ 	**3 marks for correct answer with working.** **2 marks for working with a single error in logic or calculation** **1 mark for working with some correct logic.**
	(d) $v^2 = u^2 + 2as$ $v = 4$, $u = 2$ and $a = 3$ $4^2 = 2^2 + 2 \times 3 \times s$ $16 = 4 + 6s$ $12 = 6s$ $s = \frac{12}{6} = 2$	**3 marks for correct answer with working.** **2 marks for working with a single error in logic or calculation** **1 mark for working with some correct logic.**
3.	(a) $\frac{3a - 9}{5} = 2a + 8$ $5 \times \frac{3a - 9}{5} = 5 \times 2a + 5 \times 8$ $3a - 9 = 10a + 40$ $3a = 10a + 49$ $-7a = 49$ $a = \frac{49}{-7}$ $a = -7$	**3 marks for correct answer with working.** **2 marks for working with a single error in logic or calculation** **1 mark for working with some correct logic.**

	(b) Is Mikes age = m, Leos age $= m - 4$ Sum of ages = 28 $m + (m - 4) = 28$ $2m - 4 = 28$ $2m = 32$ $m = \frac{32}{2} = 16$ Mike is 16 and Leo is 12.	**3 marks for correct answer with working.** **2 marks for working with a single error in logic or calculation** **1 mark for working with some correct logic.**
	(c) $c - \frac{8c}{5} = \frac{c+5}{4}$ $20 \times c - 20 \times \frac{8c}{5} = \frac{20 \times (c+5)}{4}$ $20c - 32c = 5c + 25$ $-17c = 25$ $c = \frac{-25}{17} = -1\frac{8}{17}$	**3 marks for correct answer with working.** **2 marks for working with a single error in logic or calculation** **1 mark for working with some correct logic.**
	(d) $\frac{2x+5}{3} \geq 2x - 8$ $3 \times \frac{2x+5}{3} \geq 3 \times 2x - 3 \times 8$ $2x + 5 \geq 6x - 24$ $2x \geq 6x - 29$ $-4x \geq -29$ $x \leq \frac{-29}{-4}$ $x \leq 7\frac{1}{4}$	**3 marks for correct answer with working.** **2 marks for working with a single error in logic or calculation** **1 mark for working with some correct logic.**