Year 7

Introductory Algebra

Non Calculator Section

Skills and Knowledge Assessed:

Name

- Introduce the concept of variables as a way of representing numbers using letters (ACMNA175)
- Extend and apply the laws and properties of arithmetic to algebraic terms and expressions (ACMNA177)
- Simplify algebraic expressions involving the four operations (ACMNA192)

Answer all questions in the spaces provided on this test paper by:

Writing the answer in the box provided.

or

Shading in the bubble for the correct answer from the four choices provided.

Show any working out on the test paper. Calculators are **not** allowed.

1.	$m^{5} = ?$ $\square m + m + m + m + m$ $\square 5 + m$	
2.	$p+p+p+p+q+q=?$ $p^{4}+q^{2} \qquad \Box 6pq$	
3.	Ms Gausden asks her class to write an expression which of these algebraic expressions could	ession which is "Four times the square of m" represent this?
4.	Simplify $5k + 3k + k$.	
5.	Simplify $3a \times 6d$.	

Given that p = 4, r = 3 and t = 6, what is the value of $\frac{pr}{t}$? 6.

- 1
- 2
- □ 6
- 37

Which of these is the same as $\frac{c^2}{5}$? 7.

- \square $(c \times c) \times 5$ \square $(c + c) \times 5$ \square $(c \times c) 5$ \square $(c \times c) \div 5$

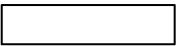
Which of these does **not** simplify to $12x^2y$? 8.

 \Box $3x^2 \times 4y$

 $12x \times xy$

 $\frac{36x^2y}{3}$

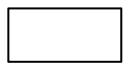
Simplify 8a + 7b - 3a + 8b. 9.



 $6qy \times 5 qx = ?$ 10.

- 11qxy
- \Box $11q^2xy$
 - \square 30qxy
- \Box $30q^2xy$

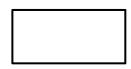
Simplify $\frac{30m^2h}{}$ 11.



Simplify $15ab - 5a^2 - 6ab - 11a^2$. 12.

- \square $-9ab-16a^2$ \square $9ab-16a^2$ \square $9ab-6a^2$ \square $21ab+16a^2$

13. If k = 5, r = 6 and s = 4, what is the value of $\frac{2k+r}{s}$?



 $2z^2m \times 6zm = ?$

- \square $12z^2m^2$
- \square 12 z^3m
- \square $12z^3m^2$
- \square $26z^3m^2$

Simplify $\frac{4a^2 \times 3ab}{6a \times b}$.

		7
		- 1
		- 1
		- 1
		- 1
		- 1
		- 1

16. If a is an integer between 0 and 4 inclusive, what is the smallest value of $a^2 - 4a + 5$?



17. 4(a-6) = ?

- \Box 4a 6
- \Box 4a 10
- \Box 4a 2
- \Box 4a 24

18. A cup holds x ml of water and a mug holds 2x + 10 ml of water.

How much water does 3 cups and 2 mugs hold?

- \Box 5x + 10 ml
- \Box 7x + 10 ml
- \Box 7x + 20 ml
- \square 9x + 20 ml

A rectangular sheet of plastic is *l* cm long and *w* cm wide. What is the combined area of 5 of these sheets?

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Using *n* for the number, write an expression in algebraic symbols for the following. "*Take any number, double it and add five, then divide the result by 10.*"

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Short Answer
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Answer all questions in the spaces provided on this test paper Writing the answer in the box provided. or Shading in the bubble for the correct answer from the four of the same any working out on this test paper. Calculators are allow	choices provided.
1. Simplify $13a - 6a + 8a$.	
2. Simplify $3m + 12d - 8d - 7m$.	
3. If $x = -4$, what is the value of $2x^2 + 15$?	
4. $4x^{2}y^{3} = ?$ $4 \times x \times 2 \times y \times 3$ $4 \times x \times x \times y \times y \times y$ $4 \times 4 \times x \times x \times y \times y \times y$	$\times y \times y$ $\times x \times y \times y \times y$
Write $8 \times 8 \times 8 \times 8 \times 8$ in index form.	

6.

If p = 6 and q = -3, what is the value of $\frac{-6p}{q^2}$?

- □ -6
- □ -4
- \neg
- \Box 6

7.

Write an albegraic expression for: "Multiply the sum of x and y by 4."

8.

 $\frac{ab}{a^2+b} = ?$

- \Box $(a+b) \div (2 \times a+b)$
- \square $(a+b) \div (a \times a+b)$
- \Box $(a \times b) \div (2 \times a + b)$
- \Box $(a \times b) \div (a \times a + b)$

9.

Simplify: $2 \times d \times e + 4ed - e \times d$.

10.

Which of the following does **not** simplify to give $6r^2g$?

 \square 3r × 2rg

 \square $r^2 \times 6g$

11.

If k = 4.5, m = 0.3 and n = 0.5, what is the value of $\frac{3k}{mn}$?

- 22.5
- \square 30
- 90

12.

Simplify $9m^3 + 7m^2 - m^3 + 6m - 12m^2 + 8m$.

- \square $8m^3 5m^2 + 14m$
- $\Box 9m^3 5m^2 + 14m$
- \square $8m^3 19m^2 + 14m$
- $\Box 10m^3 5m^2 + 14m$

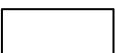
When y = 8, s = -5 and f = 6, which expression has a value of -6. 13.

 $\Box \frac{ys}{f+4}$

 $y_S + f$

 $y^2 + sf$

Simplify $\frac{2m}{3} \times \frac{9m}{4}$. 14.



When a = -6, b = -12 and c = -1, what is the value of $\frac{a^2 + bc^3}{a^2}$? 15.

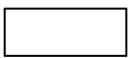
- -8
- 4
- 8

Simplify $\frac{3mn^2 \times 8m^2n^2}{16m^3n^3}$. 16.

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Which expression is not equal to $12z^2y^3$? 17.

Given that w = -3.8 and v = 6.2, what is the value of $w(v - w)^2$? 18.



19. Which of these means the same as $x = (y + z)^2$

- \square x is equal to the square of the sum of y and z.
- \square x is equal to twice the sum of y and z.
- x is equal to the sum of y squared and z.
- \Box x is equal to the sum of z squared and y.

20. Which of these is always true, regardless of the values of a, b and c?

- \Box a+b+c=b+c-a
- \Box $a \times (b \times c) = (a \times b) \times c$
- \Box $a \times (b+c) = (a+b) \times (a+c)$

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Non Calculator Section

ANSWERS

No.	WORKING	ANSWER
1.	$m^5 = m \times m \times m \times m \times m$	2 nd answer
2.	p+p+p+p+q+q = (p+p+p+p)+(q+q) = 4p + 2q	3 rd answer
3.	Four times the square of $m = 4 \times m^2 = 4m^2$	1 st answer
4.	5k + 3k + k = 9k	9 <i>k</i>
5.	$3a \times 6d = 18ad$	18 <i>ad</i>
6.	$p = 4, r = 3 \text{ and } t = 6,$ $\frac{pr}{t} = \frac{4 \times 3}{6}$ $= \frac{12}{6}$ $= 2$	2 nd answer
7.	$\frac{c^2}{5} = \frac{c \times c}{5}$ $= (c \times c) \div 5$	4 th answer
8.	$\frac{24x^2y}{2x} = 12xy \neq 12x^2y$ The rest are equal to $12x^2y$	3 rd answer
9.	8a + 7b - 3a + 8b = 8a - 3a + 7b + 8b $= 5a + 15b$	5a + 15b

10.	$6qy \times 5 qx = 5 \times 6 \times q \times q \times x \times y$ $= 30q^{2}xy$	4 th answer
11.	$\frac{30m^2h}{6m} = 5mh$	5mh
12.	$15ab - 5a^2 - 6ab - 11a^2 = 9ab - 16a^2$	2 nd answer
13.	$k = 5, r = 6 \text{ and } s = 4,$ $\frac{2k+r}{s} = \frac{2 \times 5 + 6}{4}$ $= \frac{16}{4}$ $= 4$	4
14.	$2z^2m \times 6zm = 12z^3m^2$	3 rd answer
15.	$\frac{4a^2 \times 3ab}{6a \times b} = \frac{12a^3b}{6ab}$ $= 2a^2$	$2a^2$
16.	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	1
17.	$4(a-6) = 4 \times (a-6)$ = 4 \times a - 4 \times 6 = 4a - 24	4 th answer

18.	Amount that 3 cups and 2 mugs hold = $3 \times x + 2 \times (2x + 10)$ = $3x + 4x + 20$ = $7x + 20$ ml	3 rd answer
19.	Area of 1 sheet = $l \times w = lw$ Area of 5 sheets = $lw \times 5$ = $5lw$	5lw
20.	"Take any number (n) Double it gives $2n$ Add five, gives $2n + 5$ Divide the result by 10 gives $\frac{2n+5}{10}$	$\frac{2n+5}{10}$

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ANSWERS

No.	WORKING	ANSWER
1.	13a - 6a + 8a = 7a + 8a = 15a	15 <i>a</i>
2.	3m + 12d - 8d - 7m = 3m - 7m + 12d - 8d $= -4m + 4d$	-4m + 4d
3.	$2x^{2} + 15 = 2 \times (-4)^{2} + 15$ $= 2 \times 16 + 15$ $= 32 + 15$ $= 47$	47
4.	$4x^2y^3 = 4 \times x \times x \times y \times y \times y$	3 rd answer
5.	$8 \times 8 \times 8 \times 8 \times 8 \times 8 = 8^6$	8 ⁶
6.	$\frac{-6p}{q^2} = \frac{-6 \times 6}{(-3)^2}$ $= \frac{-36}{9}$ $= -4$	2 nd answer
7.	"Multiply the sum of x and y by 4." The sum of x and $y = x + y$ Multiply this by $4 = 4 \times (x + y) = 4(x + y)$	$4 \times (x + y)$ or $4(x + y)$
8.	$\frac{ab}{a^2+b} = (a \times b) \div (a \times a + b)$	4 th answer

9.	$2 \times d \times e + 4ed - e \times d = 2ed + 4ed - ed$ $= 5ed$	5ed or 5de
10.	$3r \times 2rg = 6r^{2}g$ $r^{2} \times 6g = 6r^{2}g$ $\frac{12r^{2}}{2g} = \frac{6r^{2}}{g} \neq 6r^{2}g$ $\frac{2(3rg)^{2}}{3g} = \frac{2 \times 9r^{2}g^{2}}{3g} = \frac{18r^{2}g^{2}}{3g} = 6r^{2}g$	3 rd answer
11.	$\frac{k = 4.5, m = 0.3 \text{ and } n = 0.5}{\frac{3k}{mn}} = \frac{3 \times 4.5}{0.3 \times 0.5} = \frac{13.5}{0.15} = 90$	4 th answer
12.	$9m^{3} + 7m^{2} - m^{3} + 6m - 12m^{2} + 8m = 9m^{3} - m^{3} + 7m^{2} - 12m^{2}$ $= 8m^{3} - 5m^{2} + 14m$	1 st answer
13.	$y = 8, s = -5 \text{ and } f = 6$ $\frac{ys}{f+4} = \frac{8 \times -5}{6+4} \qquad \frac{3y+f}{s} = \frac{3 \times 8+6}{-5}$ $= \frac{-40}{10} \qquad = \frac{30}{-5}$ $= -4 \qquad = -6$ $ys+f = 8 \times (-5)+6 \qquad y^2+sf = 8^2+(-5)\times 6$ $= -40+6 \qquad = 64-30$ $= -34 \qquad = 34$	2 nd answer
14.	$\frac{2m}{3} \times \frac{9m}{4} = \frac{18m^2}{12} = \frac{3m^2}{2}$	$\frac{3m^2}{2}$

15.	When $a = -6$, $b = -12$ and $c = -1$, $ \frac{a^2 + bc^3}{ac} = \frac{(-6)^2 + (-12) \times (-1)^3}{(-6) \times (-1)} $ $ = \frac{36 + (-12) \times (-1)}{6} $ $ = \frac{36 + 12}{6} $ $ = \frac{48}{6} $ $ = 8$	4 th answer
16.	$\frac{3mn^2 \times 8m^2n^2}{16m^3n^3} \cdot = \frac{24m^3n^4}{16m^3n^3} = \frac{3n}{2}$	$\frac{3n}{2}$
17.	$6zy \times 2y^{2} = 12zy^{3} \neq 12z^{2}y^{3}$ $\frac{48z^{3}y^{3}}{4z} = 12z^{2}y^{3}$ $3y(2yz)^{2} = 3y(4y^{2}z^{2}) = 12z^{2}y^{3}$ $\frac{(6y^{2}z^{2})^{2}}{3yz^{2}} = \frac{36y^{4}z^{4}}{3yz^{2}} = 12z^{2}y^{3}$	1 st answer
18.	Given that $w = -3.8$ and $v = 6.2$, $w(v - w)^{2} = -3.8 \times (6.2 - (-3.8))^{2}$ $= -3.8 \times (6.2 + 3.8)^{2}$ $= -3.8 \times (10)^{2}$ $= -3.8 \times 100$ $= -380$	-380
19.	x is equal to the square of the sum of y and $z \Rightarrow x = (y + z)^2$ x is equal to twice the sum of y and $z \Rightarrow x = 2(y + z)$ x is equal to the sum of y squared and $z \Rightarrow x = y^2 + z$ x is equal to the sum of z squared and $y \Rightarrow x = z^2 + y$	1 st answer

20.
$$a+b+c = b+c-a$$
 is not true e.g. $3+4+5 \neq 4+5-3$ $12 \neq 6$

$$a + (b + c) = a + b + a + c$$
 is not true
e.g. $3 + (4 + 5) \neq 3 + 4 + 3 + 5$
 $12 \neq 15$

$$a \times (b \times c) = (a \times b) \times c$$
 is true
e.g. $3 \times (4 \times 5) = (3 \times 4) \times 5$
 $3 \times 20 = 12 \times 5$

Can be shown to be true for any three numbers

$$a \times (b+c) = (a+b) \times (a+c)$$
 is not true
e.g. $3 \times (4+5) \neq (3+4) \times (3+5)$
 $3 \times 9 \neq 7 \times 8$
 $27 \neq 56$

3rd answer