High School Mathematics Test 2014

Year 7

Introductory Algebra

Non Calculator Section

Skills and Knowledge Assessed:

- 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)

Name_____

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. $a + a + a + a + a + a = ?$

   ☐ $5a$ ☐ $6a$ ☐ a^5 ☐ a^6

2. $4p^3 = ?$

   ☐ $4 + p + p$ ☐ $4 + p + p + p$ ☐ $4 \times p \times p$ ☐ $4 \times p \times p \times p$

3. Richard says to Amber: *"I doubled x and added the square of y."*
   Which of these algebraic expressions could represent this?

   ☐ $2x + y^2$ ☐ $2y + x^2$
   ☐ $2(x + y)^2$ ☐ $(2x + y)^2$

4. Simplify $8a + 7a - 4a$.

5. Simplify $2m \times -3n$.

6. If $a = 6$, $b = 4$ and $c = 5$, find the value of $a^2 + 2bc$.

7. Which of these is equal to $12a^2b$?

- ☐ $6a \times 2b$
- ☐ $3ab \times 4ab$
- ☐ $12a \times ab$
- ☐ $24a^2b \div 2ab$

8. Which of these is the same as $12k + 9m$?

- ☐ $5k + 3m + 7k + 5m$
- ☐ $9k + 15m + 3k - 6m$
- ☐ $2 \times 6k + 4 \times 5m$
- ☐ $24k \div 2 + 18m \div 2m$

9. Simplify: $2pq - 4p^2 - 8pq - 3p^2$.

10. Which of the following is **not** equivalent to $14d^2e$. ?

- ☐ $10d^2e + 4d^2e$
- ☐ $7d^2 \times 2e$
- ☐ $\frac{28d^2e}{2}$
- ☐ $16d^2e - 2d^2$

11. Simplify $\frac{18m^2}{6m}$.

12. Express $12p^2 + 5pr - 8r^2 + pr$ in simplest form.

13. Which of these is equivalent to $-\frac{5ab}{2c}$? ?

- ☐ $-\frac{15a^2bc}{6ac^2}$
- ☐ $\frac{-10ab^2}{4c}$
- ☐ $\frac{-15a^2bc}{-6ac^2}$
- ☐ $\frac{-20a^2bc}{-8ac^2}$

14. If $r = -4$, $z = 12$ and $x = 6$, find the value of $\frac{4z}{xr}$.

15. Simplify $\frac{6m^2}{5n} \times \frac{10n}{3m}$.

16. When $n = 15$, $p = -6$ and $q = -3$, calculate the value of $\frac{n}{q} - p^2 q$.

17. Which of the following is not a possible answer when a positive integer is substituted into the expression $x^2 + x$?

☐ 6 ☐ 9 ☐ 20 ☐ 30

18. Which expression is equivalent to $3 \times (a + 4)$?

☐ $a + 12$ ☐ $3a + 4$ ☐ $12a$ ☐ $3a + 12$

19. A bottle of water has a mass of m grams. Which expression would give the mass of N bottles of water (in kilograms)?

☐ $\frac{mN}{1000}$ ☐ $N + \frac{m}{1000}$ ☐ $\frac{m + N}{1000}$ ☐ $1000mN$

20. Write an algebraic expression for :

The difference between the square of x and the quotient of w and r .

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Introductory Algebra

Calculator Allowed Short Answer Section

Name_____

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1. Simplify the expression $2m + 5m + 7m$.

2. Simplify the expression $3 + 5p + 6 + p$.

3. When $s = -3$, what is the value of $s^2 - 4s$?

   ☐ -3 ☐ 9 ☐ 21 ☐ 30

4. a^3 means the same as :

   ☐ $3a$ ☐ $a + 3$ ☐ $a + a + a$ ☐ $a \times a \times a$

5. Write $d \times d \times d \times d$ in simplest form.

6. Justine said *"Take the product of m and n from the square of p."*
   Write this using algebraic notation.

7. When $a = 6$ and $d = -3$, what is the value of $2a + 3d$?

☐ 3 ☐ 6 ☐ 15 ☐ 21

8. Which of these is the same as $\frac{a^2}{2b}$?

☐ $(a \times a) \div (b + b)$ ☐ $(a \times a) \times (b + b)$

☐ $(a + a) \div (b \times b)$ ☐ $(a + a) \times (b \times b)$

9. Simplify $8z^2 - 7zx + xz - 4z^2$.

10. Which of these is not the same as $2(s + 8)$?

☐ $2s + 8$ ☐ $16s$

☐ $2s + 16$ ☐ $16s + 8$

11. When $m = 3.5$ and $n = 1.2$, what is the value of $4m - 5n$?

12. Which of the following is equivalent to $-3w^2 - 2wz$?

☐ $8w^2 - 5wz - 5w^2 + 7wz$ ☐ $-8w^2 - 5wz - 5w^2 + 7wz$

☐ $8w^2 + 5wz - 5w^2 - 7wz$ ☐ $-8w^2 + 5wz + 5w^2 - 7wz$

13. Which of these expressions has a value of -20, when $s = 4$ and $u = -3$? ?

☐ $-8s + 4u$ ☐ $8s + 6u$

☐ $-8s - 4u$ ☐ $-8s + 6u$

14. Simplify $\frac{2a}{3} \times \frac{a}{6b}$.

15. Simplify $\frac{48pq^2}{18pqr^2}$.

16. When $m = 3$, $n = -4$ and $p = 5$, what is the value of $\frac{p^2m - m}{3pn}$?

☐ –2.4 ☐ –1.2 ☐ –0.6 ☐ 1.2

17. When $y = -1.5$, $x = 4.5$ and $z = 9$, what is the value of $\frac{y}{x} + \frac{x}{z}$?

18. What is the value of $\frac{6p - 3q}{13}$, when $p = 5$ and $q = -3$.

☐ 3 ☐ 13 ☐ 39 ☐ 45

19. Which expression is **not** equivalent to $\frac{p}{tr}$?

☐ $p \div (tr)$ ☐ $p \div (t \times r)$ ☐ $p \div t \div r$ ☐ $p \div (t \div r)$

20. Write an algebraic expression which means the same as the following.

Half of the sum of s and the product of d and f.

High School
Mathematics Test 2014

Introductory Algebra
ANSWERS

Non Calculator Section (1 mark each)		
Q no		Answer
1.	$a + a + a + a + a + a = 6a$	2nd Answer
2.	$4p^3 = 4 \times p \times p \times p$	4th Answer
3.	*I doubled x and added the square of y becomes* $2x + y^2$	1st Answer
4.	$8a + 7a - 4a = 15a - 4a = 11a$	$11a$
5.	$2m \times -3n = -6mn$	$-6mn$
6.	$a^2 + 2bc = 6^2 + 2 \times 4 \times 5 = 36 + 40$ $= 76$	76
7.	$12a \times ab = 12a^2b$	3rd Answer
8.	$9k + 15m + 3k - 6m = 12k + 9m$	2nd Answer
9.	$2pq - 4p^2 - 8pq - 3p^2 = -6pq - 7p^2$	$-6pq - 7p^2$
10.	$16d^2e - 2d^2$ does not simplify.	4th Answer
11.	$\frac{18m^2}{6m} = 3m$	$3m$
12.	$12p^2 + 5pr - 8r^2 + pr = 12p^2 - 8r^2 + 6pr$	$12p^2 - 8r^2 + 6pr$
13.	$-\frac{15a^2bc}{6ac^2} = -\frac{5ab}{2c}$	$-\frac{15a^2bc}{6ac^2}$
14.	$\frac{4z}{xr} = \frac{4 \times 12}{6 \times -4}$ $= \frac{48}{-24}$ $= -2$	-2

15.	$\frac{6m^2}{5n} \times \frac{10n}{3m} = \frac{60m^2n}{15mn} = 4m$	$4m$
16.	$\frac{n}{q} - p^2q = \frac{15}{-3} - (-6)^2 \times (-3)$ $= -5 - (36) \times (-3)$ $= -5 - -108$ $= 103$	103
17.	$x^2 + x \neq 9$ if x is an integer. $2^2 + 2 = 6$ and $3^2 + 3 = 12$	2nd Answer
18.	$3 \times (a + 4) = 3 \times a + 3 \times 4 = 3a + 12.$	4th Answer
19.	Mass in grams = mN Mass in kg $= \frac{mN}{1000}$	1st Answer
20.	Square of x is x^2 Quotient is $\frac{w}{r}$ (*or* possibly $\frac{r}{w}$) Difference found by subtracting $x^2 - \frac{w}{r}$	$x^2 - \frac{w}{r}$

High School
Mathematics Test 2014

Calculator Allowed Section (1 mark each)		
Q No		Answer
1.	$2m + 5m + 7m = 14m$	$14m$
2.	$3 + 5p + 6 + p = 9 + 6p$	$9 + 6p$
3.	$s^2 - 4s = (-3)^2 - 4(-3) = 9 - -12 = 21$	3rd Answer
4.	$a^3 = a \times a \times a$	4th Answer
5.	$d \times d \times d \times d = d^4$	d^4
6.	*"Take the product of m and n from the square of p."*	$p^2 - mn$
7.	$2a + 3d = 2 \times 6 + 3 \times -3 = 12 - 9 = 3$	1st Answer
8.	$(a \times a) \div (b + b) = \frac{a^2}{2b}$	1st Answer
9.	$8z^2 - 7zx + xz - 4z^2 = 4z^2 - 6zx$	$4z^2 - 6zx$
10.	$2(s + 8) = 2s + 16.$	3rd Answer
11.	When $m = 3.5$ and $n = 1.2$, $4m - 5n = 4 \times 3.5 - 5 \times 1.2$ $= 14 - 6$ $= 8$	20
12.	$-8w^2 + 5wz + 5w^2 - 7wz = -3w^2 - 2wz$	4th Answer
13.	$-8s - 4u = -8 \times 4 - 4 \times (-3)$ $= -32 + 12$ $= -20$	3rd Answer
14.	$\frac{2a}{3} \times \frac{a}{6b} = \frac{2a^2}{18b} = \frac{a^2}{9b}$	$\frac{a^2}{9b}$
15.	$\frac{48pq^2}{18pqr^2} = \frac{\cancel{48}^{8}\ \cancel{pq}\ \cancel{2}}{\cancel{18}^{3}\ \cancel{pqr}^{2}} = \frac{8q}{3r^2}$	$\frac{8q}{3r^2}$

16.	When $m = 3$, $n = -4$ and $p = 5$, $\dfrac{p^2m - m}{3pn} = \dfrac{5^2 \times 3 - 3}{3 \times 5 \times -4}$ $= \dfrac{72}{-60} = -1.2$	2nd Answer
17.	$\dfrac{y}{x} + \dfrac{x}{z} = -\dfrac{1.5}{4.5} + \dfrac{4.5}{9} = -\dfrac{1}{3} + \dfrac{1}{2} = \dfrac{3}{6} - \dfrac{2}{6} = \dfrac{1}{6}$	$\dfrac{1}{6}$
18.	$\dfrac{6p - 3q}{5} = \dfrac{6 \times 5 - 3 \times -3}{13} = \dfrac{39}{13} = 3$	1st Answer
19.	$p \div (t \div r) = p \div \left(\dfrac{t}{r}\right)$ $= p \times \left(\dfrac{r}{t}\right)$ $= \dfrac{pr}{t}$	4th Answer
20.	Half of the sum of s and the product of d and f. The product of d and f is df. The sum is $s + df$. Half the sum is $\dfrac{s + df}{2}$	$\dfrac{s + df}{2}$