MTH 05, Test 1, V. 1, 09/27/18 Luis Fernández

NAME:_____SOLUTION_____

There are **20** questions. The **14** multiple choice are worth 5 points each; the **6** free response are worth **6** points each. For multiple-choice questions, circle your answer. For free-response questions, **SHOW ALL WORK** to receive full credit.

1. Evaluate: $-8^2 - \dfrac{3}{7} \cdot 14 =$

(a) -70

(b) 58

(c) 70

(d) -65

Solution:

$$\begin{aligned}
-8^2 - \frac{3}{7} \cdot 14 &= -64 - \frac{3}{7} \cdot 14 \\
&= -64 - 6 \\
&= \boxed{-70}
\end{aligned}$$

2. Add: $\dfrac{7}{9} + \dfrac{5}{12} =$

(a) $\dfrac{31}{12}$

(b) $\dfrac{13}{3}$

(c) $\dfrac{12}{21}$

(d) $\dfrac{43}{36}$

Solution: LCD is 36.

$$\frac{7}{9} + \frac{5}{12} = \frac{28}{36} + \frac{15}{36} = \boxed{\frac{43}{36}}$$

3. Solve the equation $9x - 5 = 5x + 7$.

(a) $x = -5$

(b) $x = 3$

(c) $x = 4$

(d) $x = \dfrac{21}{2}$

Solution:

$$\begin{aligned}
9x - 5 &= 5x + 7 \\
\Rightarrow \quad 4x - 5 &= 7 \\
\Rightarrow \quad 4x &= 12 \\
\Rightarrow \quad x &= \frac{12}{4} = \boxed{3}
\end{aligned}$$

4. Write the following sentence in symbols:
twice the sum of c and d is 5.

(a) $2c + d = 5$

(b) $2d + c = 5$

(c) $2(c + d) = 5$

(d) $2 + c + d = 5$

Solution:
The sum of c and d: $(c + d)$. Twice ($=$ two times) the sum of c and d: $2(c + d)$. Therefore, the sentence can be written as $\boxed{2(c + d) = 5}$

5. Find the value of: $2(3^2 \cdot 5 - 4^2)$.

(a) 58

(b) -35

(c) 28

(d) 122

Solution:

$$2(3^2 \cdot 5 - 4^2)$$
$$= 2 \cdot (9 \cdot 5 - 16)$$
$$= 2 \cdot (45 - 16)$$
$$= 2 \cdot (29) = \boxed{58}$$

6. Evaluate $\dfrac{6 - 5xy}{2x + y}$ when $x = 3$ and $y = -4$.

(a) 30

(b) 33

(c) -33

(d) $-\dfrac{6}{5}$

Solution:

$$\frac{6 - 5 \cdot 3 \cdot (-4)}{2 \cdot 3 + (-4)} = \frac{6 - (-60)}{2}$$
$$= \frac{6 + 60}{2} = \frac{66}{2} = \boxed{33}$$

7. Solve: $3(7x + 1) = 4(5x + 1) + 14$

(a) $x = \dfrac{9}{20}$

(b) $x = \dfrac{21}{41}$

(c) $x = 15$

(d) $x = -13$

Solution:

$$3(7x + 1) = 4(5x + 1) + 14$$
$$\Rightarrow \quad 21x + 3 = 20x + 18$$
$$\Rightarrow \quad x + 3 = 18$$
$$\Rightarrow \quad x = \boxed{15}$$

8. Solve $\dfrac{x}{3} + 5 = 7$

(a) -4

(b) $x = 6$

(c) No solution

(d) $x = \dfrac{2}{3}$

Solution:

$$\frac{x}{3} + 5 = 7$$
$$\Rightarrow \quad \frac{x}{3} = 2$$

Times 3 both sides:
$$\Rightarrow \quad \boxed{x = 6}$$

9. Evaluate: $\left(-\dfrac{10}{9}\right)\left(-\dfrac{6}{25}\right)$

(a) $\dfrac{4}{15}$

(b) $\dfrac{125}{18}$

(c) $-\dfrac{4}{15}$

(d) $-\dfrac{60}{131}$

Solution:

$$\left(-\dfrac{10}{9}\right)\left(-\dfrac{6}{25}\right)$$

$$= \left(-\dfrac{2}{3}\right)\left(-\dfrac{2}{5}\right) = \boxed{\dfrac{4}{15}}$$

10. Solve: $\dfrac{x-4}{3} = \dfrac{4}{5}$

(a) $x = 4$

(b) $x = \dfrac{32}{5}$

(c) $x = \dfrac{16}{5}$

(d) $x = -\dfrac{11}{4}$

Solution: LCD is 15.

$$\dfrac{x-4}{3} = \dfrac{4}{5}$$

Common denominator:

$$\Rightarrow \dfrac{5(x-4)}{15} = \dfrac{12}{15}$$

Remove denominators:

$$\Rightarrow 5(x-4) = 12$$

$$\Rightarrow 5x - 20 = 12$$

$$\Rightarrow 5x = 32$$

$$\Rightarrow \boxed{x = \dfrac{32}{5}}$$

11. Evaluate: $-\dfrac{35}{6} \div \dfrac{14}{9}$

(a) $-\dfrac{13}{54}$

(b) $-\dfrac{77}{18}$

(c) $-\dfrac{245}{27}$

(d) $-\dfrac{15}{4}$

Solution:

$$-\dfrac{35}{6} \div \dfrac{14}{9} = -\dfrac{35}{6} \cdot \dfrac{9}{14}$$

$$= -\dfrac{5}{2} \cdot \dfrac{3}{2}$$

$$= \boxed{-\dfrac{15}{4}}$$

12. Ten more than twice a number is 46. What is the number?

(a) 29

(b) 34

(c) 5

(d) 18

Solution:

Let us say that the number we want is called "x".

Then "twice the number" is $2 \cdot x$. "Ten more than twice the number" is $2 \cdot x + 10$.

Thus, we get the equation:

$$2 \cdot x + 10 = 46$$

$$\Rightarrow 2 \cdot x = 36$$

$$\Rightarrow x = 18$$

$$\boxed{\text{Therefore the number is 18}}$$

13. Evaluate exactly $-b + \sqrt{b^2 - 4ac}$ when $a = 3$, $b = 5$, $c = (-2)$.

(a) $-5 + \sqrt{30}$

(b) -2

(c) 2

(d) -4

Solution:
$$-5 + \sqrt{5^2 - 4 \cdot 3 \cdot (-2)}$$
$$= -5 + \sqrt{25 - (-24)}$$
$$= -5 + \sqrt{25 + 24}$$
$$= -5 + \sqrt{49}$$
$$= -5 + 7 = \boxed{2}$$

14. Evaluate $g(2)$ for the function $g(x) = 3x^2 - 4x + 2$

(a) -4

(b) 30

(c) 2

(d) 6

Solution:
$$
\begin{aligned}
g(2) &= 3 \cdot 2^2 - 4 \cdot 2 + 2 \\
&= 3 \cdot 2^2 - 4 \cdot 2 + 2 \\
&= 3 \cdot 4 - 4 \cdot 2 + 2 \\
&= 12 - 8 + 2 \\
&= \boxed{6}
\end{aligned}
$$

———Free response questions start here. SHOW ALL WORK!!!———

15. Solve $5(x + 2) = 2x - 7$

Solution:
$$
\begin{aligned}
\text{If} \quad & 5(x + 2) = 2x - 7 \\
\Rightarrow \quad & 5x + 10 = 2x - 7 \\
\Rightarrow \quad & 3x + 10 = -7 \\
\Rightarrow \quad & 3x = -17 \\
\Rightarrow \quad & \boxed{x = -\frac{17}{3}}
\end{aligned}
$$

16. Twice a number minus 7 is equal to the same number plus 3. What is the number?

Solution:
Suppose that the number is 'x'. Then 'twice the number' is $2x$, and 'twice the number minus 7' is $2x - 7$.
On the other hand, 'the number plus 3' is $x + 3$.

Therefore, 'Twice a number minus 7 is equal to the same number plus 3' translates to $2x - 7 = x + 3$.
Solve the equation: $2x - x = 3 + 7 \rightarrow x = 10$.
Therefore, $\boxed{\text{the number is } 10}$

17. Solve $-5x + 1 = 17 - x$

18. Evaluate: $\sqrt{36} + (-4)^2 = \boxed{22}$

Solution:
If $-5x + 1 = 17 - x$,
adding x to both sides we get
$-4x + 1 = 17$.
Subtract 1 from both sides to get,
$-4x = 16$,
and divide both sides by (-4) to get
$\boxed{x = -4}$

Solution:

$\sqrt{36} = 6$ (because $6^2 = 36$).

$(-4)^2 = (-4) \cdot (-4) = 16$.

$\sqrt{36} + (-4)^2 = 6 + 16 = \boxed{22}$

19. Solve the equation: $\dfrac{2x}{5} + \dfrac{7}{6} = \dfrac{x}{3} - 2$

20. Evaluate: $\dfrac{4}{5} - \dfrac{2}{7} \div \dfrac{5}{14} = \boxed{0}$

Solution:
The LCD is 30. Write all fractions with denominator 30 (note $2 = \frac{2}{1}$):

$$\frac{2x}{5} + \frac{7}{6} = \frac{x}{3} - \frac{2}{1}$$
$$\Rightarrow \quad \frac{12x}{30} + \frac{35}{30} = \frac{10x}{30} - \frac{60}{30}$$

Remove denominators:
$$\Rightarrow \quad 12x + 35 = 10x - 60$$

Subtract 10 x and 35 from both sides:
$$\Rightarrow \quad 2x = -95$$
$$\Rightarrow \quad x = \boxed{-\frac{95}{2}}$$

Solution:

$$\frac{4}{5} - \frac{2}{7} \div \frac{5}{14} = \frac{4}{5} - \frac{2}{7} \cdot \frac{14}{5}$$
$$= \frac{4}{5} - \frac{2}{1} \cdot \frac{2}{5} = \frac{4}{5} - \frac{4}{5} = \boxed{0}.$$