MTH 05, Test 1, V. 3, 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. Solve: $\dfrac{x-4}{3} = \dfrac{4}{5}$

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

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

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

(d) $x = 4$

Solution: LCD is 15.

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

Common denominator:

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

Remove denominators:

$$\Rightarrow \quad 5(x-4) = 12$$
$$\Rightarrow \quad 5x - 20 = 12$$
$$\Rightarrow \quad 5x = 32$$
$$\Rightarrow \quad \boxed{x = \frac{32}{5}}$$

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

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

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

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

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

Solution:

$$-\frac{35}{6} \div \frac{14}{9} = -\frac{35}{6} \cdot \frac{9}{14}$$
$$= -\frac{5}{2} \cdot \frac{3}{2}$$
$$= \boxed{-\frac{15}{4}}$$

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

(a) 18

(b) 5

(c) 34

(d) 29

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:

$$2 \cdot x + 10 = 46$$
$$\Rightarrow \quad 2 \cdot x = 36$$
$$\Rightarrow \quad x = 18$$

Therefore the number is 18

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

(a) -4

(b) 2

(c) -2

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

Solution:

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

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

(a) -65

(b) 70

(c) 58

(d) -70

Solution:

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

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

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

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

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

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

Solution: LCD is 36.

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

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

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

(b) $x = 4$

(c) $x = 3$

(d) $x = -5$

Solution:

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

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

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

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

(c) $2d + c = 5$

(d) $2c + d = 5$

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 $\boxed{2(c + d) = 5}$

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

(a) 122

(b) 28

(c) −35

(d) 58

Solution:

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

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

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

(b) −33

(c) 33

(d) 30

Solution:

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

$$
= \frac{6 + 60}{2} = \frac{66}{2} = \boxed{33}
$$

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

(a) $x = -13$

(b) $x = 15$

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

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

Solution:

$$
\begin{aligned}
& 3(7x + 1) = 4(5x + 1) + 14 \\
\Rightarrow\;& 21x + 3 = 20x + 18 \\
\Rightarrow\;& x + 3 = 18 \\
\Rightarrow\;& x = \boxed{15}
\end{aligned}
$$

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

(a) 6

(b) 2

(c) 30

(d) −4

Solution:

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

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

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

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

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

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

Solution:

$$\left(-\dfrac{10}{9}\right)\left(-\dfrac{6}{25}\right)$$
$$=\left(-\dfrac{2}{3}\right)\left(-\dfrac{2}{5}\right)=\boxed{\dfrac{4}{15}}$$

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

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

(b) No solution

(c) $x=6$

(d) -4

Solution:

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

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

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

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

Solution:

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

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

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

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

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

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

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

Solution:

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

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

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

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

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
$\boxed{x = -4}$

19. 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, $\boxed{\text{the number is } 10}$

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

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