

NAME: _____ SOLUTION _____

There are 22 questions. Some are multiple choice and some are free response.
 Each question is worth 5 points over 100 (so 10 points are extra credit).
 For multiple-choice questions, just circle your answer.
 For free-response questions, SHOW ALL WORK to receive credit.

1. Simplify: $\frac{1}{8} + \frac{1}{12} - \frac{1}{16} =$

Solution: The common denominator is 48:
 $\frac{1}{8} + \frac{1}{12} - \frac{1}{16} = \frac{6}{48} + \frac{4}{48} - \frac{3}{48} = \frac{7}{48}$.

2. Evaluate the expressions for $x = 6$, $y = 9$, and $z = 5$.

$x + 6 =$ _____

$2z - 6 =$ _____

$xyz =$ _____

$y + z =$ _____

Solution:

$x + 6 = 6 + 6 = 12$
 $2z - 6 = 2 \cdot 5 - 6 = 10 - 6 = 4$
 $xyz = 6 \cdot 9 \cdot 5 = 270$
 $y + z = 9 + 5 = 14$

3. Use the formula $F = \frac{9}{5}C + 32$ for converting degrees Celsius into degrees Fahrenheit to find the Fahrenheit measure of the Celsius temperature $C = 25$. **Circle the answer.**

(a) 37

(b) 77

(c) 51.4

(d) 257

4. Simplify: $\frac{4}{5} \cdot \frac{7}{16} =$

Solution: $\frac{4}{5} \cdot \frac{7}{16} = \frac{1}{5} \cdot \frac{7}{4} = \frac{7}{20}$.

Solution: When $C = 25$,
 $F = \frac{9}{5} \cdot 25 + 32 = 9 \cdot 5 + 32 = 45 + 32 = 77$

5. Simplify: $4 \cdot \frac{5}{8} =$

Solution: $4 \cdot \frac{5}{8} = \frac{20}{8} = \frac{5}{2}$

6. Evaluate the expression:
 $9 + 3 \cdot 7 - (8 + 3 \cdot 6) =$

Solution:

$$9 + 3 \cdot 7 - (8 + 3 \cdot 6) = 9 + 21 - (8 + 18) = 30 - 26 = 4$$

7. Evaluate: $13 - 3(8 - 4) =$

Solution: $13 - 3(8 - 4) = 13 - 3 \cdot (4) = 13 - 12 = 1$

8. Solve: $3(7x + 1) = 4(5x + 1) + 14$.
Circle the answer.

(a) -13

(b) $\frac{9}{20}$

(c) 15

(d) $\frac{21}{41}$

Solution:

$$\begin{aligned} 3(7x + 1) &= 4(5x + 1) + 14 \\ 21x + 3 &= 20x + 4 + 14 \quad (\text{distribute}) \\ 21x + 3 &= 20x + 18 \quad (\text{combine like terms}) \\ 21x &= 20x + 15 \quad (-3 \text{ from both sides}) \\ x &= 15 \quad (-20x \text{ from both sides}) \end{aligned}$$

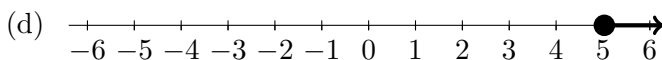
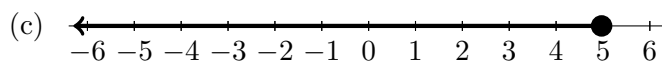
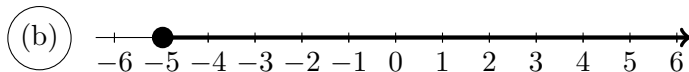
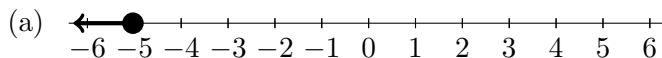
9. Solve the equation $8x - 7 = 2x - 3$.

Solution:

$$\begin{aligned}
 8x - 7 &= 2x - 3 \\
 8x - 7 &= 2x - 3 \quad (+7 \text{ to both sides}) \\
 6x &= 4 \quad (-2x \text{ from both sides}) \\
 x &= \frac{4}{6} \quad (\div 6 \text{ on both sides}) \\
 x &= \boxed{\frac{2}{3}} \quad (\text{Simplify.})
 \end{aligned}$$

10. Circle the graph of the solution to the inequality:

$$-1 - (-2 + x) \leq 3x + 21$$



Solution:

$$\begin{aligned}
 -1 - (-2 + x) &\leq 3x + 21 \\
 -1 + 2 - x &\leq 3x + 21 \quad (\text{distribute}) \\
 1 - x &\leq 3x + 21 \quad (\text{combine like terms}) \\
 -x &\leq 3x + 20 \quad (-1 \text{ from both sides}) \\
 -4x &\leq 20 \quad (-3x \text{ from both sides}) \\
 x &\geq -5 \quad (\div(-4) \text{ and swap inequality})
 \end{aligned}$$

11. Solve the inequality and express the answer as an interval.

$$x - \frac{4}{5} > \frac{6}{5}x - 2.$$

Solution:

$$\begin{aligned}
 x - \frac{4}{5} &> \frac{6}{5}x - 2 \\
 \frac{5x}{5} - \frac{4}{5} &> \frac{6}{5}x - \frac{10}{5} \quad (\text{common denominators}) \\
 5x - 4 &> 6x - 10 \quad (\text{remove denominators}) \\
 5x &> 6x - 6 \quad (+4 \text{ both sides}) \\
 -x &> -6 \quad (-6 \text{ both sides}) \\
 x &< 6 \quad (\div(-1) \text{ and swap inequality})
 \end{aligned}$$

The solution is therefore $(-\infty, 6)$.

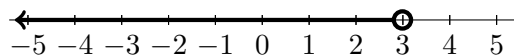
12. Solve the inequality and express the answer on the number line provided

$$6x - 14 + 2(x - 5) < 0.$$

Solution:

$$\begin{aligned}
 6x - 14 + 2(x - 5) &< 0 \\
 6x - 14 + 2x - 10 &< 0 \quad (\text{distribute}) \\
 8x - 24 &< 0 \quad (\text{combine like terms}) \\
 8x &< 24 \quad (+24 \text{ to both sides}) \\
 x &< 3 \quad (\div 8 \text{ on both sides})
 \end{aligned}$$

The solution is therefore



13. Solve for y :

$$z = 4x + 9y.$$

(a) $y = \frac{z + 4x}{9}$

(b) $y = \frac{z}{9} - 4x$

(c) $y = \frac{z - 4x}{9}$

(d) $y = 9(z - 4x)$

Solution:

$$\begin{aligned} z &= 4x + 9y \\ z - 4x &= 9y \quad (-4x \text{ both sides}) \\ \frac{z - 4x}{9} &= y \quad (\div 9 \text{ both sides}) \end{aligned}$$

14. Solve for x .

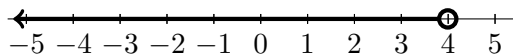
$$\frac{10}{3}x + \frac{1}{6} = \frac{7}{3}x + \frac{37}{6}$$

Solution:

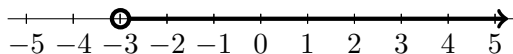
$$\begin{aligned} \frac{10}{3}x + \frac{1}{6} &= \frac{7}{3}x + \frac{37}{6} \\ \frac{20}{6}x + \frac{1}{6} &= \frac{14}{6}x + \frac{37}{6} \quad (\text{common denominator}) \\ 20x + 1 &= 14x + 37 \quad (\text{remove denominators}) \\ 20x &= 14x + 36 \quad (-14x \text{ both sides}) \\ 6x &= 36 \quad (-14x \text{ both sides}) \\ x &= 6 \quad (\div 6x \text{ both sides}) \end{aligned}$$

Solution: $x = 6$

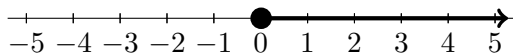
15. Express each graph below as an inequality using the variable x . Enter your answers as “ $x >$ number”, or “ $x <$ number”, or “ $x \geq$ number”, or “ $x \leq$ number”, as appropriate.



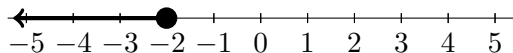
Inequality: $x < 4$



Inequality: $x > -3$



Inequality: $x \geq 0$



Inequality: $x \leq -2$

16. The volume of a pyramid is given by the equation

$$V = \frac{1}{3}Bh.$$

Solve for B .

Solution:

$$\begin{aligned} V &= \frac{1}{3}Bh \\ 3V &= Bh \quad (\cdot 3 \text{ both sides}) \\ \frac{3V}{h} &= B \quad (\div h \text{ both sides}) \end{aligned}$$

Solution: $B = \frac{3V}{h}$

17. Find

$$38 - (-30) + (-15) - 63.$$

Solution:

$$\begin{aligned} & 38 - (-30) + (-15) - 63 \\ &= 38 + 30 + (-15) - 63 \\ &= 68 + (-15) - 63 \\ &= 53 - 63 \\ &= \boxed{-10}. \end{aligned}$$

18. Solve for s when $tw = 6s - a$.

Circle the answer.

(a) $s = -\frac{tw}{a}$

(b) $s = tw - a$

(c) $s = \frac{tw + a}{6}$

(d) $s = tw - a$

Solution:

$$\begin{aligned} tw &= 6s - a \\ tw + a &= 6s \quad (+a \text{ to both sides}) \\ \frac{tw + a}{6} &= s \quad (\div 6 \text{ both sides}) \end{aligned}$$

Solution: $s = \frac{tw + a}{6}$

19. Divide or state that the division is undefined:

(Note: Your answer must be a fraction.)

$$-\frac{3}{2} \div \left(-\frac{9}{4}\right) = \boxed{\frac{2}{3}}$$

$$15 \div \left(-\frac{3}{2}\right) = \boxed{-10}$$

Solution:

(a) $-\frac{3}{2} \div \left(-\frac{9}{4}\right) = \frac{3}{2} \cdot \frac{4}{9} = \boxed{\frac{2}{3}}$

(b) $15 \div \left(-\frac{3}{2}\right) = -15 \cdot \frac{2}{3} = \boxed{-10}$

20. Solve the equation $8x + 10 = -7$.

Solution:

If $8x + 10 = -7$,

then $8x = -17$,

which implies $x = \boxed{-\frac{17}{8}}$.

21. Solve for C in the formula $F = \frac{9}{5}C + 32$.

Solution:

$$F = \frac{9}{5}C + 32$$

$$F - 32 = \frac{9}{5}C \quad (-32 \text{ on both sides})$$

$$5(F - 32) = 9C \quad (\cdot 5 \text{ on both sides})$$

$$\frac{5}{9}(F - 32) = C \quad (\div 9 \text{ on both sides})$$

Therefore, the solutions is $C = \frac{5}{9}(F - 32)$

22. Solve the equation $|x - 2| = 3$.

Solution: If $|x - 2| = 3$, then

either $x - 2 = 3$, so $x = 5$,

or $x - 2 = -3$, so $x = -1$.

Therefore there are two solutions:

$x = 5$ and $x = -1$.