MTH 06, Test 1, V. 2, 03/01/22 Prof. Luis Fernández

NAME: _____ SOLUTION _____

There are 30 questions. Some are multiple choice and some are free response.
Each question is worth 4 points, totalling 120 points.
Any points over 100 and up to 110 will count as extra credit.
For multiple-choice questions, just circle your answer.
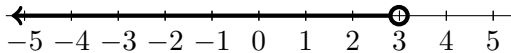For free-response questions, SHOW ALL WORK to receive credit.

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

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

Solution:

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

The solution is therefore

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

Solution:

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

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

(a) 257

(b) 51.4

(c) 77

(d) 37

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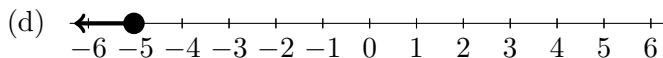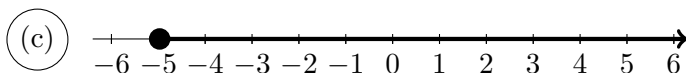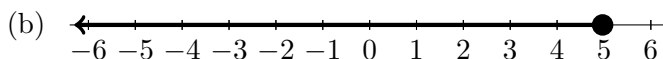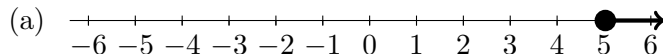$F = \dfrac{9}{5} \cdot 25 + 32 = 9 \cdot 5 + 32 = 45 + 32 = \boxed{77}$

4. Circle the graph of the solution to the inequality:
$$-1 - (-2 + x) \le 3x + 21$$

(a)

(b)

(c)

(d)

Solution:

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

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

(a) $\dfrac{21}{41}$

(b) 15

(c) $\dfrac{9}{20}$

(d) -13

Solution:

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

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

Solution:

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

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

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

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

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

9. 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) $15 \div \left(-\frac{3}{2}\right) = -15 \cdot \frac{2}{3} = \boxed{-10}$

10. Solve for x.

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

Solution:

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

Solution: $\boxed{x = 6}$

11. Find

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

Solution:

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

12. Solve for y and circle the answer:

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

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

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

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

(d) $y = \dfrac{z + 4x}{9}$

Solution:

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

13. Simplify the numerical expression

$$\left(\frac{10}{11}\right)^0.$$

Solution: $\boxed{1}$.

14. For the polynomial $x^2 + x^5 - 3x - 5$,

a) Determine the coefficient and the degree of each term.

Solution:

Term	Coefficient	Degree
x^2	1	2
x^5	1	5
$-3x$	-3	1
-5	-5	0

b)
The degree of the polynomial is $\boxed{5}$,

The leading term is $\boxed{x^5}$,

The leading coefficient is $\boxed{1}$.

15. Simplify the expression $(3x^6y^3)(7x^{15}y^{11})$

Solution:
$\boxed{21x^{21}y^{14}}$

16. Simplify the expression $\left(\dfrac{10x^4y^3}{5x^6y^{-3}}\right)^4$

Solution:

$\boxed{16x^{-8}y^{24}}$ or $\boxed{\dfrac{16y^{24}}{x^8}}$

17. Subtract: $(6x^2 + 4x - 4) - (-7x^2 - 4x - 5)$

Solution: $\boxed{13x^2 + 8x + 1}$.

18. Find the x and y intercepts of the graph of the equation $y = x + 6$.

Solution:

The x intercept is: $\boxed{-6}$

The y intercept is: $\boxed{6}$

19. Add: $(7x^3 - 4x^2 + 4x - 2) + (5x^3 - 7x^2 + x - 6)$

Solution: $\boxed{12x^3 - 11x^2 + 5x - 8}$

20. Given the function $f(x) = 3x^2 + 5x - 2$, calculate the following values:

Solution:

- $f(0) = \boxed{-2}$

- $f(2) = \boxed{20}$

- $f(-2) = \boxed{0}$

- $f(x + 1) = \boxed{3(x + 1)^2 + 5(x + 1) - 2}$

- $f(-x) = \boxed{3x^2 - 5x - 2}$

21. Multiply: $(6x - 6)(x^2 + 2x + 3)$

Circle the answer

Solution:

(a) $6x^3 + 6x^2 + 18x - 18$

(b) $6x^3 + 18x^2 + 6x - 18$

(c) $6x^3 + 6x^2 + 6x - 18$

(d) $6x^3 + 18x^2 + 18x - 18$

22. Multiply the polynomials: $(x - 1)(x + 3)$

Solution: $\boxed{x^2 + 2x - 3}$

23. Square the binomial: $(x - 5)^2$.

Solution: $\boxed{x^2 - 10x + 25}$.

24. Divide and write in scientific notation:

$$\frac{1.2 \times 10^3}{4.8 \times 10^7}$$

Circle the answer

Solution:

(a) 4×10^{-5}

(b) 4×10^{10}

(c) 2.5×10^{-5}

(d) 0.25×10^{-4}

25. Write in scientific notation:

63400000

Solution:

$\boxed{6.34 \times 10^7}$

26. Write in scientific notation.

0.0039

Solution:

$\boxed{3.9 \times 10^{-3}}$

27. Write in decimal notation

Solution:

$5.4 \times 10^{-4} = \boxed{0.00054}$

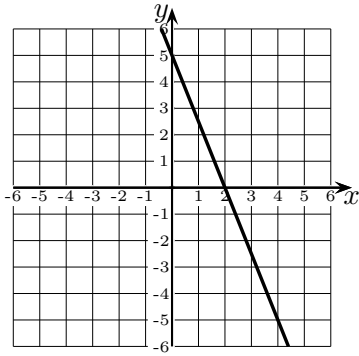**28.** Simplify the expression $\dfrac{30x^{14}y^{17}z^{17}}{6x^9y^{12}z^{14}}$
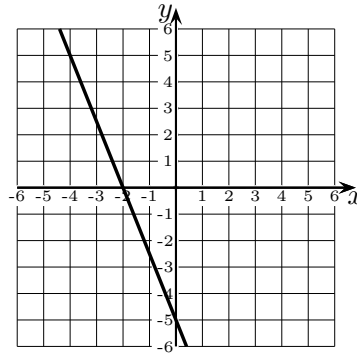
Solution:

$\boxed{5x^5y^5z^3}$.

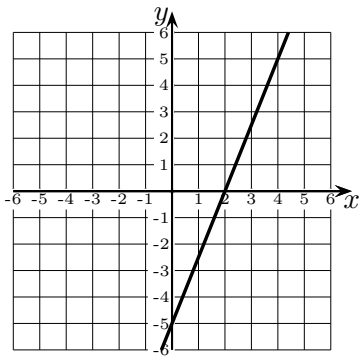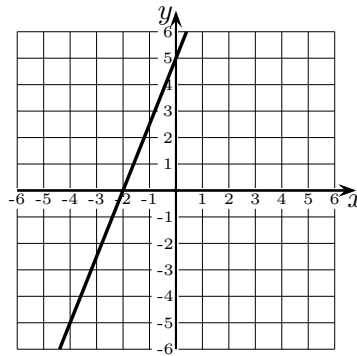**29.** Which of the following is the graph of the equation $10x - 4y = 20$? (Circle the answer).

Solution:
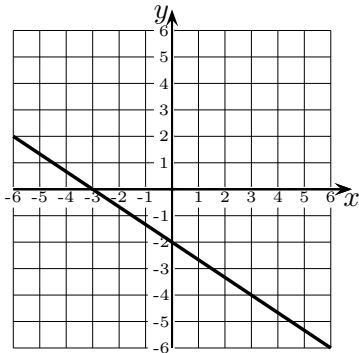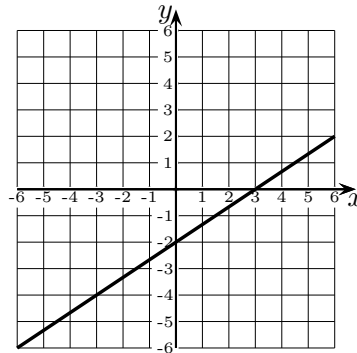
(a)

(c)

(b)

(d)

30. Which of the following is the graph of the equation $2x - 3y = -6$? (Circle the answer).

Solution:

(a)

(c)

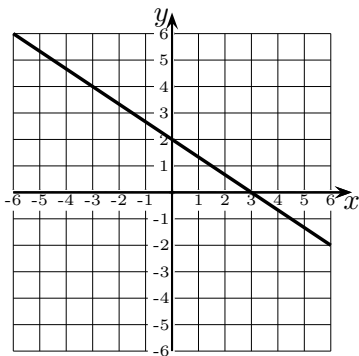
(b)

(d)