# MTH 06, Test 1, V. 3, 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.**

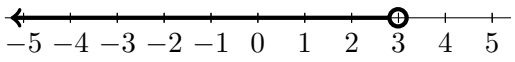
**1.** Solve the inequality and express the answer on the number line provided

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

**Solution:**

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

The solution is therefore




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

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

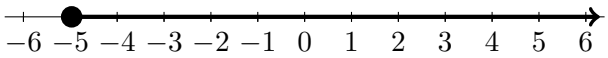
**3.** Evaluate the expression:
$9 + 3 \cdot 7 - (8 + 3 \cdot 6) =$

**Solution:**

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

**4. Circle** the graph of the solution to the inequality:

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

(a)
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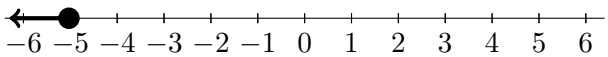


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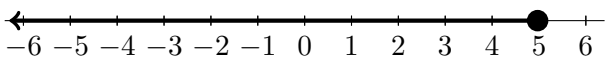


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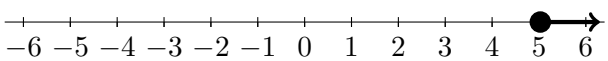



**Solution:**

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

**5.** Solve for $y$ and circle the answer:

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

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

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

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

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

**Solution:**

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

**6.** 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: $\boxed{x = 6}$

**7.** 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) $-\dfrac{3}{2} \div \left(-\dfrac{9}{4}\right) = \dfrac{3}{2} \cdot \dfrac{4}{9} = \boxed{-\dfrac{2}{3}}$

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

**8.** Find

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

**Solution:**

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

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

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

(b) $-13$

(c) 15

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

**Solution:**

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

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

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

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

**Solution:**

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

**12.** 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) 77

(b) 37

(c) 51.4

(d) 257

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

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

**Solution:**

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

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

**Solution:**

- $f(0) = \boxed{-2}$
- $f(2) = \boxed{20}$
- $f(-2) = \boxed{0}$
- $f(x+1) = \boxed{3(x+1)^2 + 5(x+1) - 2}$
- $f(-x) = \boxed{3x^2 - 5x - 2}$

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

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

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

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

**19.** 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: $\boxed{6}$

**20.** Simplify the numerical expression

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

**Solution:** $\boxed{1}$.

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

**Circle the answer**

**Solution:**

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

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

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

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

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

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

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

**Solution:**

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

**24.** Write in scientific notation:

63400000

**Solution:**

$\boxed{6.34\times10^7}$

**25.** Divide and write in scientific notation:

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

**Circle the answer**

**Solution:**

(a) $2.5 \times 10^{-5}$

(b) $0.25 \times 10^{-4}$

(c) $4 \times 10^{10}$

(d) $4 \times 10^{-5}$

**26.** Write in scientific notation.

$$0.0039$$

**Solution:**

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

**27.** Write in decimal notation

**Solution:**

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

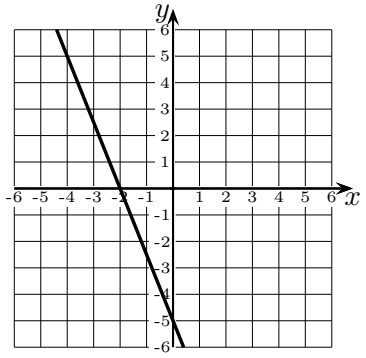
**28.** Multiply the polynomials: $(x-1)(x+3)$

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

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

**Solution:**

(a)



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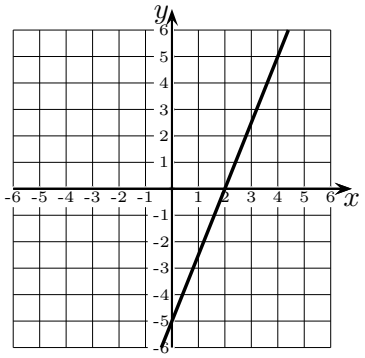

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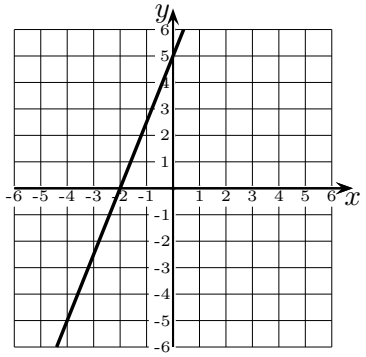

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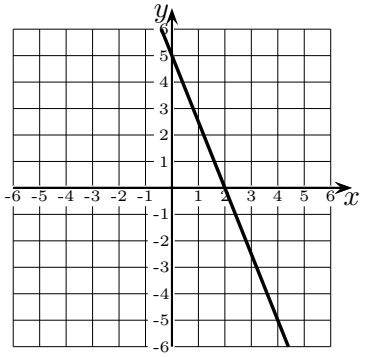
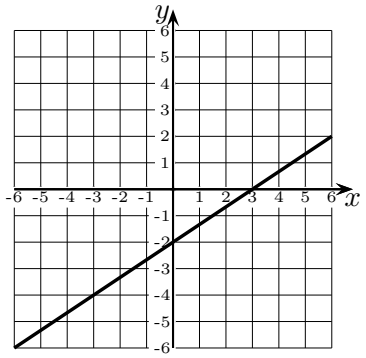


**30.** Which of the following is the graph of the equation $2x - 3y = -6$? (Circle the answer).

**Solution:**

(a)



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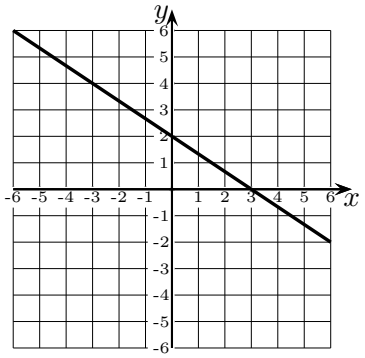

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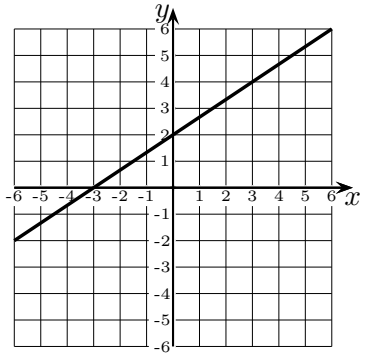

(d)