

Mesa College – Math 46 - Challenge Exam SAMPLES

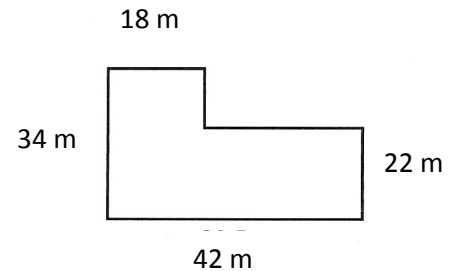
Directions: NO CALCULATOR. Write neatly and show your work and steps. Answers without appropriate work shown will receive NO credit. Attach your neat, organized solution sheets behind this cover sheet. Make sure each solution is properly labeled. **Be sure to write your answer in simplest form.**

1. Perform the following operations.

(a) $-4^2 + (7 - 5)^3 - 6 - 3(2)^2$ (b) $-2^2 + (8 - 6)^3 - 2(4)^2$

(c) $(6x^2 - 2x + 9) - (-2x^3 + 5x^2 + 6x) + (5x^3 - 3x^2 - 8x + 2)$

(d) $(5x^2 + 6x - 9) - 3(-3x^3 - 3x^2 - 6x) + 5(2x^3 - 3x^2 - 12x + 2)$



2. Find the area and perimeter of the L-shaped room at the right.

3. Solve each. Also, graph the solution on a number line.

(a) $3(5 - 2x) \geq -5x - 2(3 - x)$ (b) $5(3 - 5x) \geq -5x - 2(3 - 2x)$

4. Find an equation of the line passing through the given points:

(a) $(-7, -3)$ and $(7, -5)$ (b) $(5, -2)$ and $(11, -2)$ (c) $(6, 5)$ and $(11, 9)$ (d) $(3, 7)$ and $(3, -5)$

5. Graph each line. ALSO, label the coordinates of the x- and y-intercepts **on the graph**.

(a) $2x - 3y = 18$ (b) $5x - 3y = -15$ (c) $y = \frac{-5}{3}x - 1$ (d) $x = 5$

6. Perform the indicated operation.

(a) $\frac{8x^2 - 10x - 3}{4x^2 + 6x} \div \frac{x^3 - x}{8x^2}$ (b) $\frac{3x}{x^2 - 4x} - \frac{2x - 1}{x^2 - 16}$ (c) $\frac{6x^2 + 11x + 3}{3x^2 + 6x} \div \frac{9x^2 - 1}{6x^2}$ (d) $(5x + 4)^2$

(e) $\frac{2x}{x^2 - 5x} - \frac{2}{x^2 - 25}$ (f) $\frac{5x}{x^2 - y^2} - \frac{5y}{x^2 - y^2}$ (g) $(2x - 3)(3x^2 + 3x - 7)$

7. Solve the following:

(a) $-(k + 44) = -8 - 6(5k + 7)$ (b) $\frac{1}{2}(x + 5) = \frac{2}{3}(x - 6)$ (c) $\frac{2x - 5}{6} = \frac{5x - 1}{5}$

(d) $-2(9k + 7) = 8 - 6(3k + 7)$ (e) $2(4x + 7) = 4(2x + 3) + 2$

8. Solve the following by factoring:

(a) $x^2 + x - 56 = 0$ (b) $40y^3 + 110y^2 = 30y$ (c) $x^2 + 5x + 6 = 0$ (d) $x^3 + x^2 - 4x - 4 = 0$

9. If $f(x) = 2x^2 - x$ find the following:

(a) $f(-3)$ (b) $f(0)$ (c) $f(a + 2)$ (d) $f(0.5)$

10. The length of a rectangle is three more than twice its width. The perimeter of the rectangle is 53 inches. Find the length, width and area of the rectangle.

11. Simplify completely. Assume all variables represent positive values. Make sure the final answers have only positive exponents.

(a) $(-3x^3)^2 \cdot (-2x^5)$ (b) $\frac{12x^5y^{-3}}{16x^{-3}y^{-5}}$ (c) $(3x^4)^2 \cdot (4x^3)$ (d) $\frac{8x^{-2}y^3}{6x^{-3}y^{-5}}$ (e) $2x(-6x^2y^3)^0$

ANSWERS for the Mesa College - Math 46 Challenge Exam SAMPLES

Remember: No calculators of any form, and all answers should be completely simplified.

1a) -26

1b) -28 1c) $7x^3 - 2x^2 - 16x + 11$

1d) $19x^3 - x^2 - 36x + 1$

2a) Area = $1,140 \text{ m}^2$

2b) Perimeter = 152 m

3a) $\{x \mid x \leq 7\}$ or $(-\infty, 7]$

3b) $\{x \mid x \leq \frac{7}{8}\}$ or $(-\infty, \frac{7}{8}]$

4a) $y = \frac{-1}{7}x - 4$ or $x + 7y = -28$

4b) $y = -2$

4c) $y = \frac{4}{5}x + \frac{1}{5}$ or $4x - 5y = -1$

4d) $x = 3$

5) see below

6a) $\frac{4(4x+1)(2x-3)}{(x+1)(x-1)(2x+3)}$

6b) $\frac{x+13}{(x+4)(x-4)}$

6c) $\frac{4x^2 + 6x}{(x+2)(3x-1)}$

6d) $25x^2 + 40x + 16$

6e) $\frac{2x+8}{(x+5)(x-5)}$

6f) $\frac{5}{x+y}$

6g) $6x^3 - 3x^2 - 23x + 21$

7a) $\left\{\frac{-6}{29}\right\}$ or $k = \frac{-6}{29}$

7b) $\{39\}$ or $x = 39$

7c) $\left\{\frac{-19}{20}\right\}$ or $x = \frac{-19}{20}$

7d) 'no solution' or $\{\}$

7e) 'identity' or 'set of all real numbers' or \mathfrak{R} or $(-\infty, \infty)$

8a) $\{-8, 7\}$

8b) $\left\{-3, 0, \frac{1}{4}\right\}$

8c) $\{-3, -2\}$

8d) $\{-2, -1, 2\}$

9a) $f(-3) = 21$

9b) $f(0) = 0$

9c) $f(a+2) = 2a^2 + 7a + 6$

9d) $f(0.5) = 0$

10a) width = $7\frac{5}{6} \text{ in}$; length = $18\frac{2}{3} \text{ in}$; Area = $146\frac{2}{9} \text{ in}^2$

11a) $-18x^{11}$

11b) $\frac{3x^8y^2}{4}$

11c) $36x^{11}$

11d) $\frac{4xy^8}{3}$

11e) $2x$

See below for graphs

