Unit 4 Practice Test: Factoring Polynomials

Find the GCF of the pair of numbers.

1. $12a^2b^3$ and $18a^3b^2$

$6a^2b^2$ ← biggest number goes into both expressions

2. $4(x-3)^4$ and $6(x-3)^7$

$2(x-3)^4$

Solve by factoring.

3. $x^2-12x=-32$

$+32 \quad +32$

$x^2-12x+32=0$

$(x-8)(x-4)=0$

$x-8=0 \quad x-4=0$

$x=8 \quad x=4$

32, $-8 \cdot -4$, -12

4. $6x^2-5x-4=0$

$x^2-5x-24=0$ (−24, −8, +3, −5)

$(x-8)(x+3)$ Reduce!

$\left(\frac{x}{6}-\frac{8}{6}\right)\left(\frac{x}{6}+\frac{3}{6}\right)$

$\left(x-\frac{4}{3}\right)\left(x+\frac{1}{2}\right) \rightarrow (3x-4)(2x+1)$

$3x-4=0 \quad +4 \quad +4$

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

$2x+1=0 \quad -1 \quad -1$

$\frac{2x}{2}=\frac{-1}{2}$

$x=\frac{4}{3}$, $x=-\frac{1}{2}$

5. $3x^3-2x^2+48x+32=0$

$(3x^3-2x^2)+(48x+32)=0$

$-16 \quad -16$

$x^2(3x-2)-16(3x-2)=0$

$(x^2-16)(3x-2)=0$

$(x-4)(x+4)(3x-2)=0$

$x-4=0 \quad +4 \quad +4$

$x+4=0 \quad -4 \quad -4$

$3x-2=0 \quad +2 \quad +2$

$\frac{3x}{3}=\frac{2}{3}$

$x=4$, $x=-4$, $x=2/3$

6. $25x^2+70x=-49$

$+49 \quad +49$

$25x^2+70x+49=0$

Don't worry about this one...

Solve using the quadratic formula.

7. $-3x^2+x=-8$

$+3x^2 \quad -x$

$0=3x^2-x-8$

$a=3 \quad b=-1 \quad c=-8$

$x=\frac{-B\pm\sqrt{B^2-4AC}}{2A}$

$x=\frac{-(-1)\pm\sqrt{(-1)^2-4(3)(-8)}}{2(3)}$

$x=\frac{1\pm\sqrt{1+96}}{6}$

$x=\frac{1\pm\sqrt{97}}{6}$

$x=\frac{1\pm 9.85}{6}$

$x\approx\frac{1+9.85}{6}$

$x\approx 1.81$

$x\approx\frac{1-9.85}{6}$

$x\approx -1.48$

8. $x^2+2x-5=0$ $\quad a=1 \quad b=2 \quad c=-5$

$x=\frac{-B\pm\sqrt{B^2-4AC}}{2A}$

$x=\frac{-2\pm\sqrt{2^2-4(1)(-5)}}{2(1)}$

$x=\frac{-2\pm\sqrt{4+20}}{2}$

$x=\frac{-2\pm\sqrt{24}}{2}$

$x=\frac{-2\pm 4.9}{2}$

$x=\frac{-2+4.9}{2}\approx 1.45\approx x$

$x=\frac{-2-4.9}{2}\approx -3.45\approx x$

How many x-intercepts does the equation have?

B^2-4AC

9. $y=-\frac{1}{3}x^2+6x$ $\quad a=-\frac{1}{3} \quad b=6 \quad c=0$

B^2-4AC

$6^2-4\left(-\frac{1}{3}\right)(0)$

36 ← positive →

2 real solutions

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w many solutions do each of the equations have?

B^2-4AC

10. $y=-x^2+3x-8$ and $y=-\frac{1}{2}x^2+8x-32$

$a=-1$
$=3$
$=-8$

B^2-4AC
$3^2-4(-1)(-8)$
$9-32$
negative

no real solutions

$a=-\frac{1}{2}$
$B=8$
$C=-32$

B^2-4AC
$8^2-4(-\frac{1}{2})(-32)$
$64-64$
zero

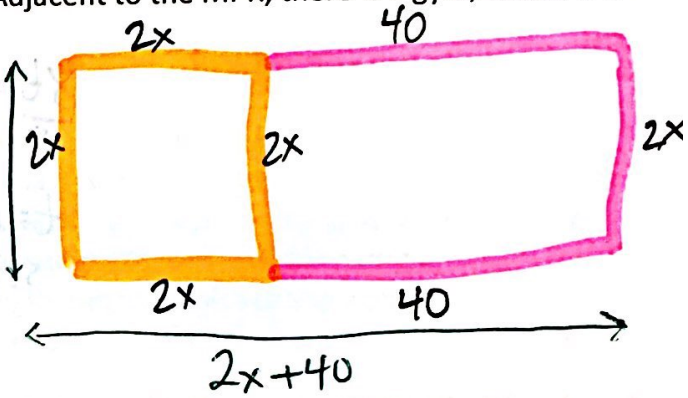
no real solutions

sk

11. A high school has a square MPR with side length 2x yards. Adjacent to the MPR, there is a gym, which is 2x yards long and 40 yards wide.

$l \times w$

The total area for both the MPR and the gym is 6000 yd^2.



a. Define the variables.

$A = l \cdot w$

b. Write an equation that represents the total area.

$2x \cdot (2x+40) = 6000$

$4x^2+80x = 6000$

c. Use your equation to find the dimensions of the MPR and the gym.

$4x^2+80x=6000$
$-6000 \quad -6000$

$\frac{4x^2}{4}+\frac{80x}{4}-\frac{6000}{4}=0$

$4(x^2+20x-1500)=0$

-1500 / -30 / $+50$ / $+20$

$4(x+50)(x-30)=0$

$x+50=0$
$-50 \quad -50$
$x=-50$

$x-30=0$
$+30 \quad +30$
$x=30$

$l=2x=2(30)$
$l=60$ yd

$w=2x+40$
$=2(30)+40$
$=60+40$
$w=100$ yd

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Task.

12. A model rocket is launched from the ground into the air with an initial velocity of 200 ft/sec. After how many seconds does it land? (HINT: Use the vertical motion equation: $h = -16t^2 + vt + c$)

h = initial height

ending height

↳ c=0

a. Define the variable.

t = time in seconds

b. Write the expression that shows the rocket's height in factored form.

GCF = 8t

$0 = -16t^2 + 200t + 0$

$0 = 8t(-2t + 25)$

c. Solve.

$0 = 8t(-2t+25)$

$\frac{8t}{8} = \frac{0}{8}$

$t = 0$ seconds

$-2t + 25 = 0$

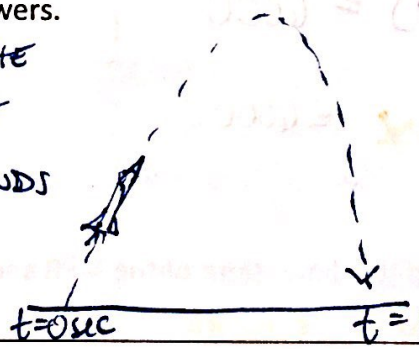
$-25 \quad -25$

$\frac{-2t}{-2} = \frac{-25}{-2}$

$t = 12.5$ seconds

d. Describe the meaning of both of your answers.

THE MODEL ROCKET IS ON THE GROUND WHEN IT LEAVES THE GROUND AND THEN 12.5 SECONDS LATER ITS LANDED.



13. Given any factorable quadratic expression, in your own words explain how the values of a, b, and c affect the factoring process.

- IF $a = 1$, WE FACTOR USING THE FACTORING x.
  - IN THIS CASE, WE LOOK AT THE FACTORS OF C TO DETERMINE WHICH ONES TO USE, BECAUSE THE TWO FACTORS NEED TO ADD TO BE b.
- IF $a \neq 1$, WE USE BOTTOMS UP, MULTIPLYING a by C, AND THEN FACTOR USING THE FACTORING X.

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Solve or choose the best answer.

1. What are the solutions of $x^2 - 16 = 6x$?

$x^2 - 6x - 16 = 0$

$-6x \quad -6x$

$(x-8)(x+2)=0$

-16, -8, $+2$, -6

$x-8=0$ $\quad +8 \quad +8$

$x = 8$

$x+2=0$ $\quad -2 \quad -2$

$x = -2$

2. Which of the following does NOT have a factor of $(x + 3)$?

$(2x^3+6x^2)+(7x+21)$

$2x^2 \quad 2x^2 \quad 7 \quad 7$

$(2x^2+7)(x+3)$

$2x^2(x+3)+7(x+3)$

$(2x^2+7)(x+3)$

A. $2x^3 + 6x^2 + 7x + 21$

B. $x^2 + x - 12$ $\quad (x-3)(x+4)$

C. $x^2 - 9$ $\quad (x-3)(x+3)$

D. $x^2 + x - 6$ $\quad (x+3)(x-2)$

-12, $+4$, -3, $+1$

-6, $+3$, -2, $+1$

3. Which expression is NOT equivalent to the polynomial $54x^3 + 81x^2 - 15x$?

$54x^3+81x^2-15x$

$3x \quad 3x \quad 3x$

$3x(18x^2+27x-5)$

A. $3x(9x + 1)(2x - 5)$

~~B. $3x(18x^2 + 27x - 5)$~~

~~C. $3x(6x - 1)(3x + 5)$~~

~~D. $3(18x^3 + 27x^2 - 5x)$~~

$x^2+27x-90$

-90, $+30$, -3, 27

$3x(x+30)(x-3)$

$18 \quad 18$

$3x\left(x+\frac{5}{3}\right)\left(x-\frac{1}{6}\right)$

4. The amount of paint needed to cover a wall is proportional to its area. The wall is rectangular and has an area of $(2b^3 - 72b)$ square meters. Factor the polynomial to find possible expressions for the length and the width of the wall. (Assume the factors are polynomials and factor completely).

$A = 2B^3 - 72B$

$\frac{2B^3}{2B} - \frac{72B}{2B} \Rightarrow 2B(B^2-36)$

$2B(B+6)(B-6)$

5. How many real solutions does the equation $-3x^2 + 6x = 3$ have?

$-3 \quad -3$

$-3x^2+6x-3=0$

$a=-3$, $b=6$, $c=-3$

B^2-4AC

$6^2-4(-3)(-3)$

$36-36$

0

A. No Solution

B. One Solution

C. Two Solutions

D. Three Solutions

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