

1) (2 points) What does it mean to factor?

To eat tacos on Wednesday.

2) (3 points each) Find the GCF of the following:

a) p^3q^4, p^2q^4, p^8q^3

$$p^2q^3$$

b) $25x^2, 125x^4y, 50x^3y^2$

$$25x^2$$

3) (3 points each) Factor out the GCF from the following:

a) $16x^2 - 18x^3 + 20x$

$$2x(8x - 9x^2 + 10)$$

b) $70x^5y^3 - 20x^4y^3 + 30x^3y^3$

$$10x^3y^3(7x^2 - 2x + 3)$$

4) (4 points each) Factor completely:

a) $x^2 + x - 12$

$$(x+4)(x-3)$$

b) $x^2 - x - 56$

$$(x-8)(x+7)$$

c) $14x(2x+5) - 5(2x+5)$

$$(2x+5)(14x-5)$$

d) $x^3 - 3x^2 + x - 3$

$$\begin{aligned} &(x^3 - 3x^2) + (x - 3) \\ &x^2(x-3) + 1(x-3) \\ &(x-3)(x^2+1) \end{aligned}$$

e) $6x^2 + 2xy + 21x + 7y$

$$\begin{aligned} &(6x^2 + 2xy) + (21x + 7y) \\ &2x(3x + y) + 7(3x + y) \\ &(3x + y)(2x + 7) \end{aligned}$$

f) $-x^2 + x + 20$

$$\begin{aligned} &= -(x^2 - x - 20) \\ &= -(x-5)(x+4) \end{aligned}$$

5) (4 points each) S'more factoring completely:

a) $3x^4 - 3x^3 - 60x^2$

$$3x^2(x^2 - x - 20)$$

$$3x^2(x-5)(x+4)$$

b) $-2p^2q^2 - 4pq^2 - 2q^2$

$$-2q^2(p^2 + 2p + 1)$$

$$-2q^2(p+1)^2$$

c) $3xy^2 - 48x$

$$3x(y^2 - 16)$$

$$3x(y+4)(y-4)$$

d) $8 - x^3$

$$(2-x)(4+2x+x^2)$$

e) $x^4 - 16$

$$(x^2+4)(x^2-4)$$

$$(x^2+4)(x+2)(x-2)$$

f) $x^5 - 4x^3 - 8x^2 + 32$

$$(x^5 - 4x^3) + (-8x^2 + 32)$$

$$x^3(x^2 - 4) - 8(x^2 - 4)$$

$$(x^3 - 8)(x^2 - 4)$$

$$(x-2)(x^2+2x+4)(x+2)(x-2)$$

6) (1 point each) Match the factored form to the expanded form:

I $(a+b)^2$

A $(a-b)^2$

C $(a+b)(a-b)$

O $(a+b)(a^2 - ab + b^2)$

S $(a-b)(a^2 + ab + b^2)$

A: $a^3 - b^3$

B: $a^3 + b^3$

C: $a^2 - b^2$

D: $a^2 - 2ab + b^2$

E: $a^2 + 2ab + b^2$

$$(x-2)^2(x+2)(x^2+2x+4)$$

7) (6 points each) Solve the following equations for the variable:

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

$$3x-4=0 \Rightarrow x = \frac{4}{3}$$

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

b) $x^2+5x+6=0$

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

$$x+3=0 \Rightarrow x = -3$$

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

c) $4x^3-12x^2-216x=0$

$$4x(x^2-3x-54)=0$$

$$4x(x-9)(x+6)=0$$

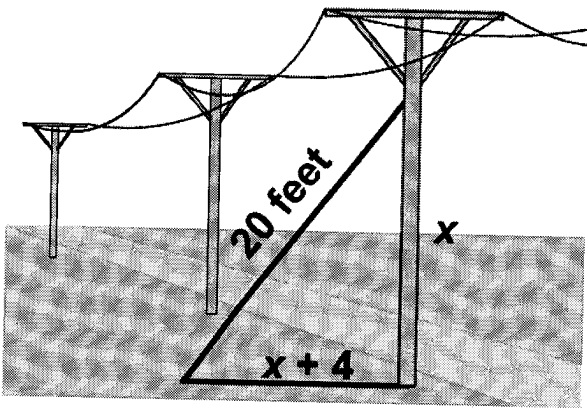
$$x = 0, 9, -6$$

d) $15x^2-19x-8=0$

$$(3x+1)(5x-8)=0$$

$$x = -\frac{1}{3} \quad x = \frac{8}{5}$$

8) (5 points) A piece of wire measuring 20 feet is attached to a telephone pole as a guy wire. The distance along the ground from the bottom of the pole to the end of the wire is 4 feet greater than the height where the wire is attached to the pole. See the picture. How far up the pole does the guy wire reach? Assume the triangle forms a right triangle.



$$(x+4)^2 + x^2 = 20^2$$

$$x^2 + 8x + 16 + x^2 = 400$$

$$2x^2 + 8x - 384 = 0 \quad \text{divide by 2}$$

$$x^2 + 4x - 192 = 0$$

$$(x+16)(x-12) = 0$$

$$\hookrightarrow x = -16$$

$$\hookrightarrow x = 12 \text{ ft}$$

9) (5 points) While mid-air, a cow gymnast calculates that the distance her hooves off the ground can be approximated by the function $h(t) = -16t^2 + 16t + 32$ where t is time in seconds and h is height in feet. At what time will the cow's hooves land on the ground?

$$-16t^2 + 16t + 32 = 0$$

divide
by -16

$$t^2 - t - 2 = 0$$

$$(t-2)(t+1) = 0$$

$$\hookrightarrow t = 2 \text{ seconds}$$

34