

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

I'm listening to the 'Tale of Dogs' soundtrack.

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

a)  $s^5t^2, s^6t^4, s^3t^3$

$$s^3t^2$$

b)  $36x^5y^3, 81x^2y^2, 45x^3y^6$

$$9x^2y^2$$

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

a)  $28x^4 + 32x^3 - 24x^2$

$$4x^2(7x^2 + 8x - 6)$$

b)  $4x^4y^4 - 16x^2y^6 - 12x^2y^4$

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

4) (3 points each) Factor completely:

a)  $x^2 - 5x - 36$

$$(x - 9)(x + 4)$$

b)  $x^2 + 7x + 10$

$$(x + 2)(x + 5)$$

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

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

d)  $(x^3 - 5x^2) + (4x - 20)$

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

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

e)  $(3xy + 6x) + (y + 2)$

$$3x(y + 2) + 1(y + 2)$$

$$(y + 2)(3x + 1)$$

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

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

$$-(x - 5)(x + 4)$$

5) (4 points each) More factoring completely. Woo!

$$3 \cdot (-10) = -30$$

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

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

$$x^2(x+2)(x-1)$$

b)  $3x^2 + x - 10$

$$3x^2 + 6x - 5x - 10$$

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

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

$$6 \quad -5$$

c)  $-4s^2t^3 - 30s^2t^2 - 36s^2t$

$$2 \cdot 18 = 36$$

$$\begin{matrix} 1 \\ 12 \end{matrix} \quad \begin{matrix} 1 \\ 3 \end{matrix}$$

$$-2s^2t(2t^2 + 15t + 18)$$

$$-2s^2t[(2t^2 + 12t) + (3t + 18)]$$

$$-2s^2t[2t(t+6) + 3(t+6)]$$

$$-2s^2t(t+6)(2t+3)$$

d)  $8x^3 + 8$

$$= 8(x^3 + 1)$$

$$= 8(x+1)(x^2 - x + 1)$$

e)  $x^4 - 16$

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

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

f)  $14x^3 - 350x$

$$= 14x(x^2 - 25)$$

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

g)  $x^4 - 20x^2 + 64$

$$= (x^2 - 4)(x^2 - 16)$$

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

h)  $16x^3 - 16x^2 - 12x$

$$4(-3) = -12$$

$$\begin{matrix} 1 \\ -6 \end{matrix} \quad \begin{matrix} 1 \\ 2 \end{matrix}$$

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

$$= 4x[(4x^2 - 6x) + (2x - 3)]$$

$$= 4x[2x(2x - 3) + 1(2x - 3)]$$

$$= 4x(2x - 3)(2x + 1)$$

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

h  $(a+b)^2$

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

e  $(a-b)^2$

B:  $a^3 - b^3$

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

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

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

D:  $a^2 - b^2$

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

E:  $a^3 + b^3$

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7) (4 points part a, 5 points parts b - d) Solve the following equations for the variable:

a)  $(7x-2)(5x+4)=0$

$7x-2=0$   
 $x=2/7$

$5x+4=0$   
 $x=-4/5$

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

$(x+5)(x+1)=0$

$x+5=0 \Rightarrow x=-5$

$x+1=0 \Rightarrow x=-1$

c)  $12x^2-17x-5=0$

$(3x-5)(4x+1)=0$

$x=5/3$        $x=-1/4$

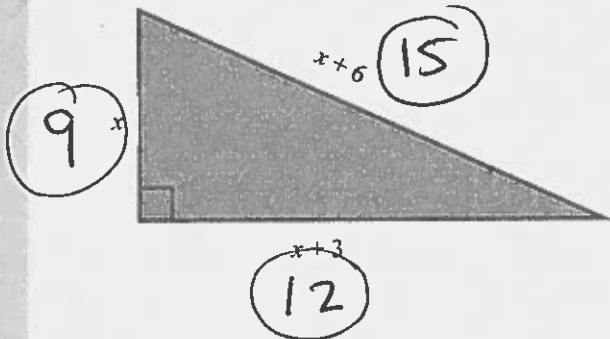
d)  $15x^3+35x^2+10x=0$

$5x(3x^2+7x+2)=0$

$5x(x+2)(3x+1)=0$

$x=0$      $x=-2$      $x=-1/3$

8) (6 points) Find the lengths of all three sides of the right triangle shown below:



$x^2 + (x+3)^2 = (x+6)^2$   
 $x^2 + x^2 + 6x + 9 = x^2 + 12x + 36$

$x^2 - 6x - 27 = 0$

$(x-9)(x+3) = 0$

$x=9$        ~~$x=-3$~~

9) (6 points) On the newest true-love reality TV show *I Would Dye for You*, contestants jump from higher and higher places into a vat of paint all to win the love of a stranger and for our entertainment. Martin calculates that the distance he is off the ground can be approximated by the function  $h(t) = -16t^2 + 104t + 56$  where  $t$  is time in seconds and  $h$  is height in feet. At what time will Martin (hopefully) land in the vat of paint?

$-16t^2 + 104t + 56 = 0$

$-8(2t^2 - 13t - 7) = 0$

$-8(2t+1)(t-7) = 0$

~~$t = -1/2$~~

$t = 7$

At  $t = 7$  seconds

3/2