Exam 3
Math 60-80 fast track
Fall 2012

Name: KEY

1) Simplify each:

a) $(2x)(3x)(4x)$

$\boxed{24x^3}$

b) $(5x^2y^4)^3$

$5^3x^6y^{12} = \boxed{125x^6y^{12}}$

c) $\left(\frac{2}{\cancel{3}_1}x^3\right)\left(\frac{\cancel{6}^2}{7}x^8\right)$

$\boxed{\frac{4}{7}x^{11}}$

d) $\frac{4a^6b^4}{16ab^7}$

$\frac{1a^5}{4b^3} = \boxed{\frac{a^5}{4b^3}}$

2) Simplify each:

a) $\frac{xy^{-1}}{3x^{-2}}$ $= \boxed{\frac{x^3}{3y}}$

b) $(2a^0b^2c^3)^3$

$2^3a^0b^6c^9 = \boxed{8b^6c^9}$

c) $(5a^2)^4(-3a^5)$

$(625a^8)(-3a^5)$

$\boxed{-1875a^{13}}$

d) $(x^2y^{-3}z^{-5})^3$

$x^6y^{-9}z^{-15}$

$\boxed{\frac{x^6}{y^9z^{15}}}$

3) Perform the indicated operation:

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

$$\boxed{7x^2 - 5x - 3}$$

b) $(-3x + 8) - (x + 2)$

$$-3x + 8 - x - 2$$

$$\boxed{-4x + 6}$$

c) $(x - 3y)(x^2 + 3xy + 9y^2)$

$$x^3 + \cancel{3x^2y} + \cancel{9xy^2} - \cancel{3x^2y} - \cancel{9xy^2} - 27y^2$$

$$\boxed{x^3 - 27y^2}$$

d) $(4x - 6)^2$

$$(4x-6)(4x-6)$$

$$16x^2 - 24x - 24x + 36$$

$$\boxed{16x^2 - 48x + 36}$$

4) Divide each by long division:

a) $\dfrac{4x^2 - 17x - 33}{4x + 7}$

$$\begin{array}{r|l} & x - 6 \\ \hline 4x+7 & 4x^2 - 17x - 33 \\ & -4x^2 \mp 7x \\ \hline & -24x - 33 \\ & \pm 24x \pm 42 \\ \hline & 9 \end{array}$$

$$\boxed{x - 6 + \frac{9}{4x+7}}$$

b) $\dfrac{x^3 - 2x^2 - 10x - 4}{x + 2}$

$$\begin{array}{r|l} & x^2 - 4x - 2 \\ \hline x+2 & x^3 - 2x^2 - 10x - 4 \\ & -x^3 \mp 2x^2 \\ \hline & -4x^2 - 10x \\ & \pm 4x^2 \pm 8x \\ \hline & -2x - 4 \\ & -2x - 4 \\ \hline & 0 \end{array}$$

$$\boxed{x^2 - 4x - 2}$$

5) Factor each completely:

a) $x^2 + 9x + 20$

$\boxed{(x+5)(x+4)}$

b) $x^2 - 5xy - 14y^2$

$\boxed{(x-7y)(x+2y)}$

-14

$-7 \quad +2$

-5

c) $3n^2 - 7n - 20$

$3n^2 - 12n + 5n - 20$

$3n(n-4) + 5(n-4)$

$\boxed{(3n+5)(n-4)}$

-60

$5 \quad -12$

-7

d) $4n^2 - 19n + 21$

$4n^2 - 12n - 7n + 21$

$4n(n-3) - 7(n-3)$

$\boxed{(n-3)(4n-7)}$

84

$-12 \quad -7$

-19

6) Factor each completely:

a) $-3x^2 + 75$

$-3(x^2 - 25)$

$\boxed{-3(x-5)(x+5)}$

b) $x^3 - 27y^3$

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

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$\boxed{(x-3y)(x^2 + 3xy + 9y^2)}$

c) $m^2 - 14mn + 48n^2$

$\boxed{(m-8n)(m-6n)}$

$+48$

$-8 \quad -6$

-14

d) $12x^2 + 2x - 70$

$2(6x^2 + x - 35)$

$2(6x^2 + 15x - 14x - 35)$

$2[3x(2x+5) - 7(2x+5)]$

$\boxed{2(2x+5)(3x-7)}$

-210

$+15 \quad -14$

1

7) Solve each equation:

a) $x(2x+3)=5$

$2x^2+3x=5$

$2x^2+3x-5=0$

$2x^2+5x-2x-5=0$

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

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

$\boxed{x=-5/2 \quad x=1}$

-10

$5 \quad -2$

3

b) $2x^2+30=16x$

$\frac{2x^2}{2}-\frac{16x}{2}+\frac{30}{2}=\frac{0}{2}$

$x^2-8x+15=0$

$(x-5)(x-3)=0$

$\boxed{x=5,\ x=3}$

c) $x^3+x^2-72x=0$

$x(x^2+x-72)=0$

$x(x+9)(x-8)=0$

$\boxed{x=0,\ x=-9,\ x=8}$

-72

$+9 \quad -8$

1

8) Write each in Scientific Notation: 32,000,000

3.2×10^7

0.00456

4.56×10^{-3}

Write each in decimal Notation: 7.6×10^8

76,000,000

1.25×10^{-5}

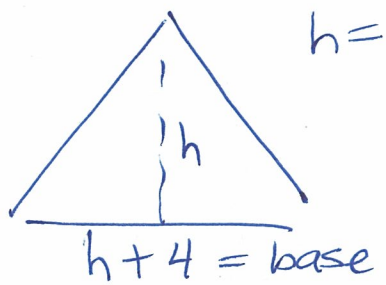
.0000125

9&10) Choose **Two** to solve:

♥ The base of a triangle is 4 meters longer than the height. Find the height and base if the area of the triangle is 48 sq. meters.

♣ If the height of a pulley after t seconds is given by: $h = 2t^2 + 3t + 20$ where h is the height in inches and t is the time in seconds. Find the time it takes for the pulley to reach a height of 40 inches.

☺The second leg of a right triangle is 2 cm. more than twice the first leg. The hypotenuse is 3 cm. longer than twice the first leg. Find the lengths of the three sides of the right triangle.



h = height

$A = \frac{1}{2} b \cdot h$

$2 \cdot 48 = \frac{1}{2}(h+4)(h) \cdot 2$

$96 = h^2 + 4h$

$0 = h^2 + 4h - 96$

$0 = (h+12)(h-8)$

$h \neq -12 \quad h = 8$

height 8 m
base 12 m

$h = 2t^2 + 3t + 20$

$40 = 2t^2 + 3t + 20$

$0 = 2t^2 + 3t - 20$

$0 = 2t^2 + 8t - 5t - 20$

$0 = 2t(t+4) - 5(t+4)$

$0 = (2t-5)(t+4)$

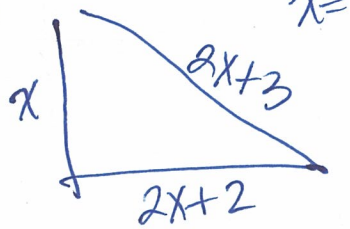
$2t - 5 = 0 \quad t + 4 = 0$

$t = 5/2 \quad t \neq -4$

$t = 2.5$

-40, $+8$, -5, 3

2.5 seconds to reach height of 40



x = first leg

$a^2 + b^2 = c^2$

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

$x^2 + 4x^2 + 8x + 4 = 4x^2 + 12x + 9$

$5x^2 + 8x + 4 = 4x^2 + 12x + 9$

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

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

$x = 5 \quad x \neq -1$

1st leg 5 cm
2nd leg 12 cm
hypotenuse 13 cm