

# MATH 120 EXAM #1 KEY (SUMMER 2010)

$$1a \quad (-4)^2 - 2(7) + (-9) = 16 - 14 - 9 = -7$$

$$1b \quad |3(-3) - 5(2)| = |-9 - 10| = |-19| = 19$$

$$2a \quad -6w^3 + 9w^2 - 1$$

$$2b \quad 24y^2 - 16y + 12 - 12y^2 + 16y - 8 = 12y^2 + 4$$

$$2c \quad 6t^2 + 11t - 10$$

$$2d \quad 16m^2 + 16mp + 4p^2$$

$$2e \quad 4r^2 - 2rs + 2hr - 6sr + 3\Delta^2 - 3hs + 2hr - hs + h^2 \\ 4r^2 - 8rs + 4hr - 4hs + 3\Delta^2 + h^2$$

$$3 \quad \begin{array}{r} 2z^2 + z - 2 \\ 3z+2 \overline{) 6z^3 + 7z^2 - 4z + 2} \\ \underline{6z^3 + 4z^2} \phantom{- 4z + 2} \\ 3z^2 - 4z \phantom{+ 2} \\ \underline{3z^2 + 2z} \phantom{+ 2} \\ -6z + 2 \\ \underline{-6z - 4} \\ 6 \end{array}$$

$$\rightarrow 2z^2 + z - 2 + \frac{6}{3z+2}$$

$$4a \quad 6x^2y(4y^2 + 5x^2)$$

$$4b \quad 3t(2\Delta + 3) - 5(2\Delta + 3) = (2\Delta + 3)(3t - 5)$$

$$4c \quad 5(4p^2 - 20pq + 25q^2) = 5(2p - 5q)^2$$

$$4d \quad (3y^3)^3 + (5z^2)^3 \\ (3y^3 + 5z^2)[(3y^3)^2 - (3y^3)(5z^2) + (5z^2)^2] \\ (3y^3 + 5z^2)(9y^6 - 15y^3z^2 + 25z^4)$$

$$4e \quad (3v^2 - 1)(2v^2 + 3)$$

$$5a \quad \frac{3r^2(r-3)}{(r+3)(r-3)} \cdot \frac{r+3}{8r^3} = \frac{3}{8r}$$

$$5b \quad \frac{3(m-5)}{4(m-5)} \cdot \frac{(m-5)(m-5)}{12(m-5)} = \frac{m-5}{16}$$

$$6 \quad \frac{\frac{1}{p} + \frac{1}{q}}{1 - \frac{1}{pq}} \cdot \frac{pq}{pq} = \frac{q+p}{pq-1}$$

$$7 \quad \frac{4y^{10}}{p^2}$$

$$8 \quad x^{-3/4}(x-2)$$

$$9a \quad \sqrt[3]{125 \cdot 2} = 5\sqrt[3]{2}$$

$$9b \quad \sqrt{4 \cdot 2 \cdot x^4 \cdot x \cdot z^8} = 2x^2z^4\sqrt{2x}$$

$$9c \quad \frac{\sqrt{2}}{\sqrt{3x}} \cdot \frac{\sqrt{3x}}{\sqrt{3x}} = \frac{\sqrt{6x}}{3x}$$

$$9d \quad 2\sqrt[3]{3} + 4 \cdot 2\sqrt[3]{3} - 3\sqrt[3]{3} = 7\sqrt[3]{3}$$

$$9e \quad \frac{\sqrt{3}}{\sqrt{5}+\sqrt{3}} \cdot \frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}-\sqrt{3}} = \frac{\sqrt{3}(\sqrt{5}-\sqrt{3})}{2} = \frac{\sqrt{15}-3}{2}$$

$$10 \quad 8x+56 = 8x+52 \text{ results after simplifying, implying that } 4=0. \text{ Contradiction. Solution set: } \emptyset.$$

$$11 \quad ax+b=3x-3a \Rightarrow ax-3x=-3a-b \Rightarrow x(a-3)=-3a-b \Rightarrow x = \frac{-3a-b}{a-3} = \frac{3a+b}{3-a}$$

$$12 \quad 2l+2w=310$$

$$2(2w-10)+2w=310$$

$$6w=330$$

$$w=55$$

So width is 55 cm & length is 100 cm.



|           | rate  | time | dist.      |
|-----------|-------|------|------------|
| Upriver   | $r$   | 1.2  | $1.2r$     |
| Downriver | $r+5$ | 0.9  | $0.9(r+5)$ |

$$\text{So, } 1.2r = 0.9(r+5) \Rightarrow 0.3r = 4.5 \Rightarrow r = 15 \text{ mph}$$

$$14 \quad i\sqrt{3} \cdot i\sqrt{8} = i^2\sqrt{24} = -\sqrt{24} = -2\sqrt{6}$$

$$15 \quad -8+4i+12i-6i^2 = -8+16i+6 = -2+16i$$

$$16 \quad \frac{6+2i}{1+2i} \cdot \frac{1-2i}{1-2i} = \frac{6-12i+2i-4i^2}{1-2i+2i-4i^2} = \frac{6-10i+4}{1+4} \\ = \frac{10-10i}{5} = 2-2i$$