

Second Review for Math 05 Fall 2005

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Please note: You should fully justify your answers.

- Find the equation of the line that:
 - passes through the point $(3, -2)$ and has slope equal to -2 .
 - passes through the points $(2, 1)$ and $(-2, -11)$.
 - passes through $(3, 4)$ and $(-7, 4)$.
 - is parallel to the line $2x - 4y = 5$ and has the same y -intercept as the line $5x - 3y = 6$.
 - is perpendicular to the line $y = -3x + 5$ and passes through $(3, 7)$.
 - is perpendicular to x -axis and passes through the point $(7, 11)$.
 - it has the same x -intercept as $2x + 3y = 12$ and the same y -intercept as $y = -3x + 6$.
- Graph each of the lines in Question 1.
- Solve for x and y :

$$\begin{cases} 2x - 3y = -23 \\ 5x + 2y = 9 \end{cases}$$

- A chemist wants to combine a 30% alcohol solution with a 60% alcohol solution to form 600 ml of a 60% solution. How much of each solution should be used to form the mixture?
- A boat makes a downstream trip of 36 mi in 2 h. Returning upstream, it took 3 h to make the trip. How fast can the boat travel in still water? What was the rate of the stream?
- Simplify: $\left(\frac{3a^4b^9}{2a^2b^7}\right)\left(\frac{a^6b^3}{a^3b^2}\right)^2$.
- Simplify: $\left(\frac{2xy^2}{z}\right)^2(-xy^2z)^3$.
- Simplify: $\frac{3x^5 - 2x^3 + 4x^2}{x^2}$.
- A rectangle has sides of $3x - 7$ and $5x + 8$. Find its perimeter and its area.
- A paper box is to be made with a piece of cardboard 10 in wide and 20 in long. The box will be formed by cutting squares of equal size out of each of the four corners and folding up the sides to make a box. If the size of the cut out square is x find the volume of the box.

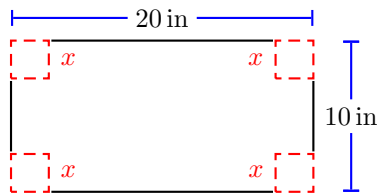


Figure 1: How to make a cardboard box.

- Divide $8x^3 - 6x^2 + 2x$ by $4x + 1$.

12. Find the remainder of the division $\frac{x^{102} - 3}{x - 1}$.
13. Factor $x^3y^3 - 2y^3 - 3x^3 + 6$.
14. Factor $5x^7y^5 - 20x^5y$.
15. Factor each of the following polynomials completely. If you think that a polynomial is not factorable state so and explain why.
- (a) $x^2 + 5x - 14$
 - (b) $6x^2 + 11x - 10$
 - (c) $x^3 + 18x - 9x^2$
 - (d) $8x^3 - 27$
 - (e) $x^3 + 125$
 - (f) $x^2 + 4$
 - (g) $12x^2 - 16x + 5$
 - (h) $x^3 - 5x^2 - x + 5$
 - (i) $x^2 + 6x + 13$
 - (j) $7x^3 - 63x$.
16. One integer is 5 less than three times another integer. Find the two integers if their product is 50.
17. Solve $y^4 - 13y^2 + 36 = 0$.
18. The volume of a rectangular parallelepiped is given by $3x^3 + 10x^2 - 23x + 10$.



Figure 2: A rectangular parallelepiped

- (a) Find the height of of the parallelepiped if the base has area $3x^2 + 13x - 10$.
- (b) Find the volume if the area of the base is is 28.