

1. Solve the equation.

$$5x - 33 = 2(x - 3)$$

$$5x - 33 = 2x - 6$$

$$3x = 27 \quad x = 9$$

$$2\left(\frac{2}{y} + \frac{7}{y} - \frac{5}{y} = 2\right) y$$

$$2 + 7 - 5 = 2y$$

$$\frac{4}{2} = \frac{2y}{2} \quad 2 = y$$

3. At 8 A.M. a snowplow, traveling at a constant speed, begins to clear a highway leading out of town. At 10 A.M. an automobile begins traveling the highway at a speed of 45 mi/hr and reaches the plow 30 minutes later. Find the speed of the snowplow.

$r = \text{rate of plow @ } 10:30$

$d = r \cdot t$
 $= 45(.5)$
 $= 22.5 \text{ miles}$

Car traveled 22.5 mi + plow 2.5 h.

$$\frac{2.5r}{2.5} = \frac{22.5}{2.5}$$

$$r = 9 \text{ mi/h}$$

4. A boy can row a boat at a constant rate of 4 mi/hr in still water. He rows upstream for 12 minutes and then rows downstream, returning to his starting point in another 10 minutes. Find the rate of the current. $r = \text{rate of current}$

distance up = distance down

$$60 \left((4-r) \frac{12}{60} = (4+r) \frac{10}{60} \right) 60$$

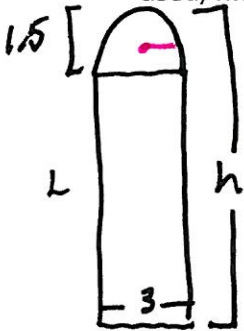
$$48 - 12r = 40 + 10r$$

$$8 = 22r$$

$$\frac{8}{22} = \frac{2r}{22}$$

$$\frac{4}{11} = r$$

5. A stained glass window is being designed in the shape of a rectangle surmounted by a semicircle. The width of the window is to be 3 feet, but the height h is yet to be determined. If 15 ft^2 of glass is to be used, find the height, h .



$$A = \frac{1}{2} \pi r^2 + lW$$

$$15 = \frac{1}{2} \pi (1.5)^2 + (h - 1.5)(3)$$

$$15 = 3.534 + 3h - 4.5$$

$$\frac{15.96}{3} = \frac{3h}{3} \quad h = 5.32$$

$$r = 3 \div 2$$

$$r = 1.5$$

6. Solve the equation.

$$\left(\frac{x}{x-2} + \frac{10}{x+2} = \frac{8}{x^2-4} \right) (x-2)(x+2)$$

$$\left(\frac{x(x+2)}{(x-2)(x+2)} + \frac{10(x-2)}{(x+2)(x-2)} = \frac{8}{(x-2)(x+2)} \right)$$

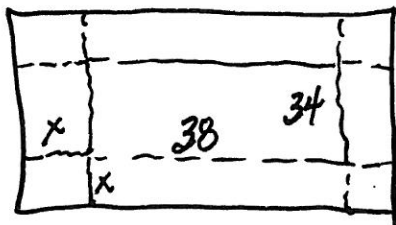
$$x^2 + 2x + 10x - 20 = 8$$

$$x^2 + 12x - 28 = 0$$

$$(x+14)(x-2) = 0$$

$x = -14$; $x = 2$

7. A rectangular plot of ground having dimensions 38 feet by 34 feet is surrounded by a walk of uniform width. If the total area of the walk & plot is 2300 ft², what is its width?



$$(38 + 2x)(34 + 2x) = 2300$$

$$1292 + 68x + 76x + 4x^2 = 2300$$

$$4x^2 + 144x - 1008 = 0$$

6 ft

$x = 6$, $x = \cancel{42}$

8. Write the expression $i(5+2i)^2$ in the form of $a+bi$.

$$i(5+2i)(5+2i)$$

$$i(25 + 20i + 4i^2)$$

$$i(21 + 20i) = 21i + 20i^2 = 21i - 20$$

9. Write the expression $(5-7i)(5+7i)$ in the form of $a+bi$.

$$25 + 49 = 74$$

10. Write the expression $\frac{-4+6i}{2+3i}$ in the form of $a+bi$.

$$\frac{-4+6i}{2+3i} \cdot \frac{2-3i}{2-3i} = \frac{-8+24i+18}{4+9}$$

$$= \frac{10+24i}{13}$$

11. Write the expression $(5+2i)^3$ in the form of $a+bi$.

$$(5+2i)(5+2i)(5+2i)$$

$$(25+20i-4)(5+2i)$$

$$(21+20i)(5+2i)$$

$$105+142i-40 = 65+142i$$

12. Write the expression $\frac{\sqrt{-4}}{\sqrt{-169}\sqrt{-361}}$ in the form of $a+bi$.

$$\frac{2i}{(13i)(19i)} = \frac{2i}{-247}$$

13. Find the solutions of the equation.

$$x^2 - 4x + 29 = 0$$

$$x^2 - 4x + 4 = -29 + 4$$

$$\sqrt{(x-2)^2} = \sqrt{-25}$$

$$x-2 = \pm 5i$$

$$x = 2 \pm 5i$$

14. Find the solutions of the equation.

$$x^4 = 81.$$

$$x^4 - 81 = 0$$
$$(x^2 - 9)(x^2 + 9) = 0$$
$$(x - 3)(x + 3)(x^2 + 9) = 0$$

$$x = 3; x = -3; x = \pm 3i$$

$$\sqrt{x^2} = \sqrt{-9}$$

$$x = \pm 3i$$

15. Solve the equation.

$$4|9x+27| - 322 = 2.$$

$$|9x+27| = \frac{324}{4}$$

$$|9x+27| = 81$$

$$9x+27=81 \text{ or } 9x+27=-81$$

$$9x=54$$

$$x=6$$

$$\frac{9x}{9} = \frac{-108}{9}$$

-or-

$$x = -12$$

16. Solve the inequality.

$$4 \geq 7x+8 > -3$$

$$\frac{-4}{7} \geq \frac{7x}{7} > \frac{-11}{7}$$

$$-\frac{4}{7} \geq x > -\frac{11}{7}$$

$$\left(-\frac{11}{7}, -\frac{4}{7}\right]$$

18. Solve the inequality.

$$|7x+1| < 7$$

$$7x+1 < 7 \text{ ; } 7x+1 > -7$$

$$\frac{7x}{7} < \frac{6}{7} \text{ ; } \frac{7x}{7} > \frac{-8}{7}$$

$$x < \frac{6}{7} \text{ ; } x > \frac{-8}{7}$$

$$\left(-\frac{8}{7}, \frac{6}{7}\right)$$

17. Solve the inequality.

$$2 \leq 4 - \frac{1}{7}x < 4$$

$$-7(-2 \leq -\frac{1}{7}x < 0)$$

$$14 \geq x > 0$$

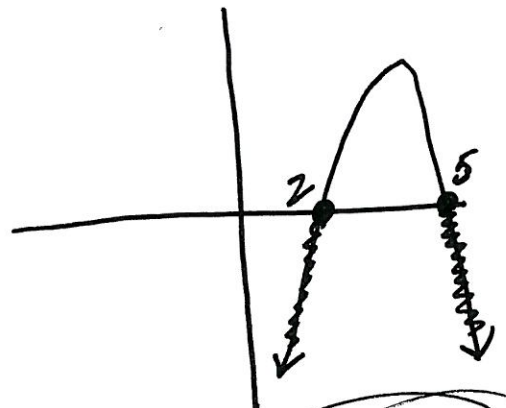
-or-

$$[0, 14]$$

19. Solve the inequality.

$$-3x^2 < -21x + 30.$$

$$-3x^2 + 21x - 30 < 0$$



$$x < 2 \text{ or } x > 5$$

