Geometry Honors
Algebra Review with a Geometry Twist!

Name: KEY
Date: _____

erpendicular bisector of a segment:

Think about each problem, and share your strategy. Then, we will do it together!

1. Find the equation of the perpendicular bisector of $\overline{RS}$ with R (-6, 2) and S (-3, -1).

$m_{\overline{RS}} = \frac{2+1}{-6+3} = \frac{3}{-3} = -1 \rightarrow m_{\perp} = 1$

midpt of $\overline{RS} = \left(\frac{-6-3}{2}, \frac{2-1}{2}\right) \rightarrow \left(-\frac{9}{2}, \frac{1}{2}\right)$

$y = mx + b$
$\frac{1}{2} = 1\left(-\frac{9}{2}\right) + b$
$5 = b$

$\boxed{y = x + 5}$

2. A line with m = -1 contains the points (5,-2) and (x,-8). Solve for x.

slope formula $\rightarrow$ $-1 = \frac{-2 - -8}{5 - x}$

$-1(5-x) = -2 + 8$
$-5 + x = 6$
$x = 11$

ck
(5, -2) (11, -8)
$m = \frac{-2 - -8}{5 - 11}$
$= \frac{6}{-6} = -1$ ✓

Complete remaining problems in groups!

3. Points R (-5, -3), S (-1,-1) and T (5, x) are collinear. Find the value of x.

Collinear means slope is same between any 2 points.

$m_{\overline{RS}} = \frac{-3+1}{-5+1} = \frac{-2}{-4} = \frac{1}{2}$ $\rightarrow$ $m_{ST} = \frac{y-y}{x-x}$ $\frac{1}{2} = \frac{x+1}{5+1}$

$6 = 2x + 2$
$4 = 2x$
$x = 2$

ck
$m_{RT} = \frac{-3-2}{-5-5} = \frac{-5}{-10} = \frac{1}{2}$ ✓

4. Find the value of a, so that the line through (7, 1) and (4, 8) is parallel to the line through (2, a) and (a,-2).

If 2 lines $\parallel$ $\rightarrow$ same slope. So $m_1 = m_2$.

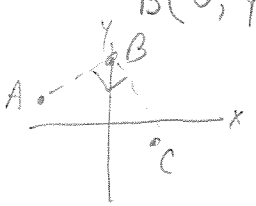
$\frac{8-1}{4-7} = \frac{a--2}{2-a} \rightarrow \frac{7}{-3} = \frac{a+2}{2-a}$

$14 - 7a = -3a - 6$
$20 = 4a$
$a = 5$

ck
$m = -\frac{7}{3}$ $m = \frac{5+2}{2-5}$
$= \frac{7}{-3}$ ✓

5. ΔABC is a right triangle with coordinates A (-4, 1) and C (2,-1). Point B is on the y-axis. Find the coordinates of B that would make m∠B = 90°.

B(0, y)



$m_{\overline{AB}} = -\frac{1}{m_{\overline{BC}}}$

$\frac{y-1}{0+4} = -\frac{1}{\frac{y+1}{0-2}}$ $\rightarrow$ $\frac{y-1}{4} = -\frac{-2}{y+1}$

$(y-1)(y+1) = 8$
$y^2 - 9 = 0$
$(y+3)(y-3) = 0$
$y = -3 \quad y = 3$

(0, 3) or (0, -3)

ck
$m_{\overline{BC}} = \frac{2}{4} = \frac{1}{2}$
$m_{\overline{BC}} = \frac{3+1}{0-2} = \frac{4}{-2}$
$m_{\overline{BB}} = \frac{1+3}{-4} = -1$
$m_{\overline{BC}} = \frac{-3+1}{0-2} = 1$

6. Find each value of k for which the lines $y = 9kx - 1$ and $kx + 4y = 12$ are perpendicular.

$Kx + 4y = 12$
$y = -\frac{Kx}{4} + \frac{12}{4}$

$9K = -1\left(-\frac{1}{\frac{K}{4}}\right)$
$9K = \frac{K}{4}$
$\frac{36K}{4} - \frac{K}{4} = 0$

$\frac{35K}{4} = 0$

7. The distance between points (1, 2) and (x, 8) is 10. Find x.

$10 = \sqrt{(1-x)^2 + (2-8)^2}$
$= \sqrt{1 - 2x + x^2 + 36}$
$10 = \sqrt{x^2 - 2x + 37}$
$100 = x^2 - 2x + 37$

$0 = x^2 - 2x - 63$
$(x-9)(x+7) = 0$
$x = 9 \quad x = -7$
$x = \{-7, 9\}$

ck
$10 \stackrel{?}{=} \sqrt{(1+7)^2 + (2-8)^2}$
$= \sqrt{64 + 36}$
$10 = 10$ ✓

$10 = \sqrt{(1-9)^2 + (2-8)^2}$
$= \sqrt{64 + 36}$
$10 = 10$ ✓

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8. Triangle MSP has vertices M (-2,-3), S (4,-5) and P (2,9). Write the equation of the perpendicular bisector of MP.

$m_{\overline{MP}} = \frac{9+3}{2+2} = \frac{12}{4} = 3$ midpt $= \left(\frac{-2+2}{2}, \frac{-3+9}{2}\right)$

$m_{\perp} = -\frac{1}{3}$ $= (0,3)$ ↑ y-intercept

$y = -\frac{1}{3}x + 3$

Algebra Review homework!

1. Find the equation of the line that passes through C (8,-2) and D (4, 12). Give your answer in standard form.
2. Are points (-6, 5), (-4, 1) and (-2, 2) collinear?
3. Find x if the distance between T(x, -2) and R (-2,-17) is 17.
4. Find the equation of the perpendicular bisector of side AB in ΔABC if A (2, 1), B (16,3) and C(4,12).
5. Determine if each pair of lines is parallel, perpendicular or neither. If they intersect, find the point of intersection.

   a) $x + 2y = 10$ $\quad 3x - 2y = 6$

   b) $3x - 2y = -16$ $\quad 2x + 3y = -15$

6. Draw an axis and graph the following lines

   a) $-5x = y - 4$ b) $3y + 5 = 2x$

7. M is the midpoint of $\overline{AB}$. Find the coordinates of B if A (1, 5) and M (2,-2).
8. Find the value of y so that the line through (-2, 1) and (10, y) is perpendicular to the line through (6,-2) and (5, 7).
9. What is the slope of the line $y = 3$? Of the line $x = -5$?
10. Find the equation of the line through (-8,-2) and parallel to x=5.
11. Find the equation of the line through (5,7) and parallel to the line $3x - y = -4$.
12. Find the equation of the line through (8,0) and perpendicular to $3x + 4y = 12$.
13. A line passes through points (-2,-1) and (4, 3). Where does the line cross the x-axis? The y-axis?

Algebra Review Hw

① $m = \frac{12+2}{4-8}$

$= \frac{14}{-4} = -\frac{7}{2}$

$(8, -12)$

$-12 = \left(-\frac{7}{2}\right)(8) + b$

$-12 + 28 = b$

$16 = b$

$y = -\frac{7}{2}x + 16$

$\frac{7}{2}x + y = 16$

$\boxed{7x + 2y = 32}$

② $m = \frac{5-1}{-6+4}$

$= \frac{4}{-2} = -2$

$m = \frac{1-2}{-4+2}$

$= \frac{-1}{-2} = \frac{1}{2}$

Since the slopes are NOT equal, the points are NOT collinear.

③ $17 = \sqrt{(x+2)^2 + (-2+17)^2}$

$289 = x^2 + 4x + 4 + 225$

$0 = x^2 + 4x - 60$

$0 = (x+10)(x-6)$

$x = -10 \quad x = 6$

CK

$(-10, -2)(-2, -17)$

$17 \stackrel{?}{=} \sqrt{(-10+2)^2 + (-2+17)^2}$

$= \sqrt{64 + 225}$

$17 \stackrel{\checkmark}{=} 17$

$(6, -2)\ (-2, -17)$

$17 = \sqrt{(6+2)^2 + (-2+17)^2}$

$= \sqrt{64 + 225}$

$17 \stackrel{\checkmark}{=} 17$

④ $m_{\overline{AB}} = \frac{3-1}{16-2}$

$= \frac{2}{14} = \frac{1}{7}$

$m_{\perp} = -7$

$\text{Midpt} = \left(\frac{2+16}{2}, \frac{1+3}{2}\right)$

$= (9, 2)$

$2 = -7(9) + b$

$65 = b$

$\boxed{y = -7x + 65}$

⑤ a) $2y = -x + 10$

$y = -\frac{1}{2}x + 5 \rightarrow m = -\frac{1}{2}$

$-2y = -3x + 6$

$y = \frac{3}{2}x - 3$

neither

$4x = 16 \quad 4 + 2y = 10$

$x = 4 \quad 2y = 6$

$y = 3$

$\boxed{(4, 3)}$

b) $-2y = -3x - 16$

$y = \frac{3}{2}x + 8$

$3y = -2x - 15$

$y = -\frac{2}{3}x - 5$

Since slopes are neg. reciprocals, 2 lines $\perp$;

$9x - 6y = -48$

$4x + 6y = -30$

$13x = -78$

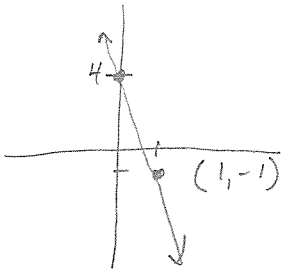
$x = -6$

$y = -9 + 8$

$y = -1$

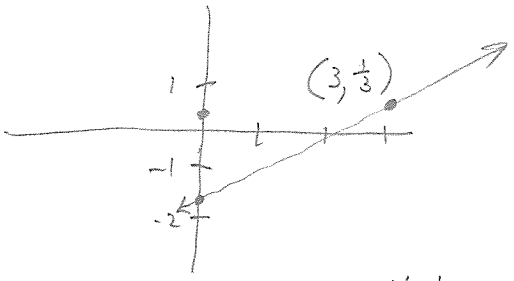
$\boxed{(-6, -1)}$

⑥ a) $y = -5x + 4$



b) $3y = 2x - 5$

$y = \frac{2}{3}x - \frac{5}{3}$



⑦ $2 = \frac{1+x}{2}$ $\quad -2 = \frac{5+y}{2}$

$4 = 1 + x$ $\quad -4 = 5 + y$

$3 = x$ $\quad y = -9$

$\boxed{B(3, -9)}$

⑧ $m = \frac{-2-7}{6-5}$

$= -9$

$\downarrow$

$m_\perp = \frac{1}{9}$

$\frac{1}{9} = \frac{y-1}{10--2}$

$12 = 9y - 9$

$21 = 9y$

$\boxed{y = \frac{7}{3}}$

⑨ Slope = 0 $\quad$ Slope = undefined

⑩ $x = -8$

⑪ $3x - y = -4$

$3x + 4 = y$

$m = 3$

$7 = 3(5) + b$

$-8 = b$

$\boxed{y = 3x - 8}$

⑫ $3x + 4y = 12$

$4y = -3x + 12$

$y = -\frac{3}{4}x + 3$

$m_\perp = \frac{4}{3}$

$0 = \frac{4}{3}(8) + b$

$-\frac{32}{3} = b$

$\boxed{y = \frac{4}{3}x - \frac{32}{3}}$

⑬ $m = \frac{3+1}{4+2} = \frac{4}{6} = \frac{2}{3}$

$3 = \frac{2}{3}(4) + b$

$\frac{9}{3} - \frac{8}{3} = b$

$b = \frac{1}{3}$

$y = \frac{2}{3}x + \frac{1}{3}$

Cross the x-axis:

$y = 0$

$0 = \frac{2}{3}x + \frac{1}{3}$

$-\frac{1}{3} = \frac{2}{3}x$

$-\frac{1}{2} = x$

$\boxed{(-\frac{1}{2}, 0)}$

y-axis:

$x = 0$

$y = \frac{1}{3}$

$\boxed{(0, \frac{1}{3})}$

Name KEY

Date _____ Period ____

Factoring Quadratic Expressions

Factor each completely. Do any 10.

1) $x^2 - 7x - 18$

$(x-9)(x+2)$

2) $p^2 - 5p - 14$

$(p-7)(p+2)$

3) $m^2 - 9m + 8$

$(m-8)(m-1)$

4) $x^2 - 16x + 63$

$(x-9)(x-7)$

5) $7x^2 - 31x - 20$

$(7x+4)(x-5)$

6) $7k^2 + 9k$

$k(7k+9)$

7) $7x^2 - 45x - 28$

$(7x+4)(x-7)$

$4x$

$-49x$

$-45x$

8) $2b^2 + 17b + 21$

$(2b+3)(b+7)$

$3b$

$14b$

$17b$

9) $5p^2 - p - 18$

$(5p+9)(p-2)$

$9p$

$-10p$

10) $28n^4 + 16n^3 - 80n^2$ * 3 factors

$4n^2(7n^2+4n-20)$

$4n^2(7n-10)(n+2)$

$-10n$

$14n$

11) $3b^3 - 5b^2 + 2b$ 3 factors

$b(3b^2 - 5b + 2)$

$b(3b - 2)(b - 1)$

$-2b$, $-3b$

12) $7x^2 - 32x - 60$

$(7x + 10)(x - 6)$

$10x$, $-42x$

13) $30n^2b - 87nb + 30b$

$3b(10n^2 - 29n + 10)$

$3b(5n - 2)(2n - 5)$

$-4n$, $-25n$

14) $9r^2 - 5r - 10$

not factorable

15) $9p^2r + 73pr + 70r$

$r(9p^2 + 73p + 70)$

$r(9p + 10)(p + 7)$

16) $9x^2 + 7x - 56$

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

not factorable

17) $4x^3 + 43x^2 + 30x$

$x(4x + 3)(x + 10)$

18) $10m^2 + 89m - 9$

$(10m - 1)(m + 9)$

Critical thinking questions:

19) For what values of b is the expression factorable?
$x^2 + bx + 12$

1, 12 $b = 13$, 8, or 7
2, 6
3, 4

20) Name four values of b which make the expression factorable:
$x^2 - 3x + b$

$b = -18$, -28, -70, or -10

Others can work too.

Name : _____ Score : _____

Teacher : _____ Date : _____

Simplify the Radicals

1) $\sqrt{200}$ = $10\sqrt{2}$

2) $12\sqrt{45}$ = $12\sqrt{9 \cdot 5} \rightarrow 36\sqrt{5}$

3) $\sqrt{324}$ = 18

4) $11\sqrt{128}$ = $11\sqrt{64 \cdot 2} \rightarrow 88\sqrt{2}$

5) $\sqrt{80}$ = $4\sqrt{5}$

6) $6\sqrt{243}$ = $6\sqrt{9 \cdot 27}$

$18\sqrt{9 \cdot 3} \rightarrow 54\sqrt{3}$

7) $\sqrt{343}$ = $\sqrt{49 \cdot 7} \rightarrow 7\sqrt{7}$

8) $\sqrt{28}$ = $2\sqrt{7}$

9) $\sqrt{25}$ = 5

10) $\sqrt{81}$ = 9