

# Honors Math 2

## Midterm Mastery Review

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Name \_\_\_\_\_

1. On a separate sheet of graph paper, graph  $y > x^2 + 2x + 1$  and  $y < x^2 - 4x + 4$  and find the intersection.
2. Solve:  $\sqrt{x + 2} = x$
3. Solve  $(x + 2)^{3/4} + 3 = 30$
4. Solve:  $\sqrt[3]{3x + 1} + 10 = 5$
5. A painting's original value when purchased was \$350. Six years later, it was worth \$429.20. Find an exponential equation to model the information. Then, find the value of the painting ten years after the purchase.
6. Find an equation in point ratio form with the points (1, 5) and (4, 30). Round your "b" value to three places.
7. In 2010, you put \$1500 into an account earning 7% annual interest. In what year will the account be worth \$2000?
8. Radium has a half-life of 1620 years. Write a function for a 3 mg sample. Find the amount of radium remaining after 50 years.
9. Solve for x and y:  $\left(\frac{3^x}{4^3}\right)^4 = \frac{1}{4^y}$
10. Simplify:  $\sqrt[4]{10x^7y^3} \cdot \sqrt[4]{60xy^8}$ .

11. Describe how the parabola  $y = -(x - 4)^2 + 3$  is shifted from  $y = x^2$ .
12. Sketch the graph of the function on a separate piece of paper.  $y = x^2 + 15x + 54$
- Find the  $x$ -intercepts.
  - Find the axis of symmetry.
  - Find the vertex.
  - Find the  $y$ -intercept.
  - Is the vertex a max or a min?
13. Find the equation of a quadratic function with intercepts at  $(-2, 0)$  and  $(4, 0)$  and a vertex at  $(1, 6)$ .

**Factor completely** and find the **solutions**.

14.  $2v^2 + 11v + 5 = 0$

15.  $7a^2 + 53a + 28 = 0$

16.  $16b^2 + 60b - 100 = 0$

Find the **discriminant** and tell the number and type of solutions.

17.  $b^2 + 16b + 64 = 0$

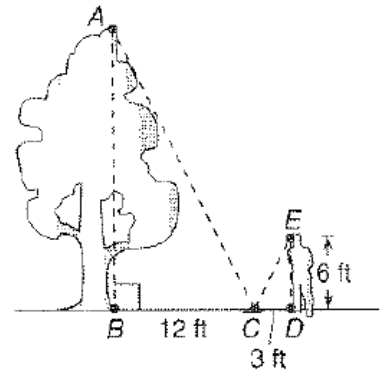
18.  $x^2 - 4x + 24 = 0$

19.  $2k^2 + 22k + 60 = 0$

20. The following function models how much money a certain company makes after a certain amount of time. At what time did they make the least amount of money?

$$v(t) = 800 - 28t + .25t^2$$

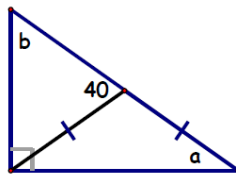
21. It is a law of physics that when a beam of light strikes a mirror, the angle of incidence ( $\angle ACB$ ) and angle of reflection ( $\angle ECD$ ) are equal. So in order to find the height of a tree, you place a mirror 3 feet in front of you on the ground and 12 feet from the base of the tree, as shown. The mirror is placed just so the light from the top of the tree hits the mirror and reflects into your eyes. Find the height of the tree, using a proportion.



22. Find  $x$  and  $y$  if  $\triangle ABC \sim \triangle PQR$ ,  $m\angle R = 5x + 70$ ,  $m\angle C = 24x - 25$ ,  $m\angle P = 4y + 2$ ,  $m\angle A = x + y$ .

23. Given that  $H$  is between  $J$  and  $K$ ,  $JK = 48$ ,  $JH = 4x - 15$ , and  $HK = 3x + 3$ , find the value of  $x$ , the length of  $JH$ , and the length of  $HK$ .

24. Find  $a$  and  $b$  in the figure.

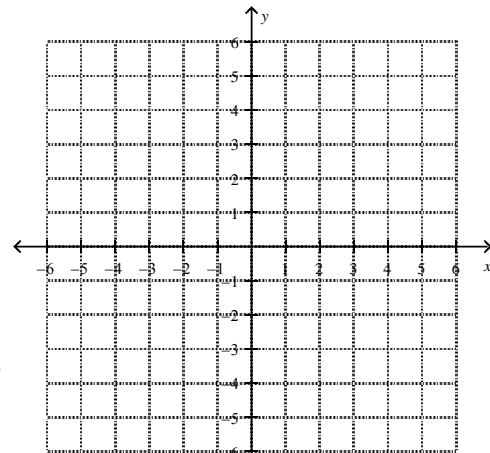


25. The vertices of a triangle are  $D(-2, 2)$ ,  $E(-2, -3)$  and  $F(5, -3)$ . Graph and label the image with a reflection over the line  $y = -x$ . Name the image vertices below.

$D'$  \_\_\_\_\_  $E'$  \_\_\_\_\_  $F'$  \_\_\_\_\_

Write the algebraic rule for a reflection over  $y = -x$ .

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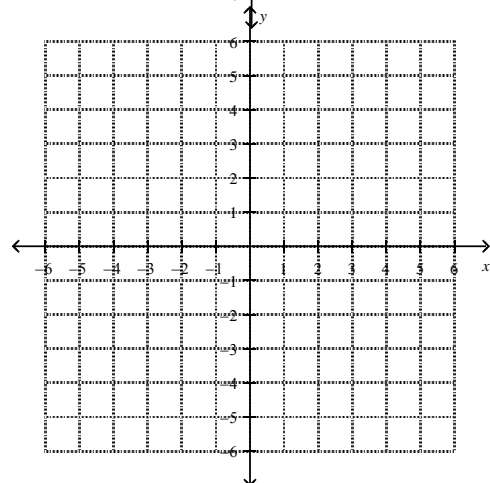
26. Graph and label the points  $J(-2, 2)$ ,  $K(-3, 1)$ ,  $L(2, 1)$  and  $M(4, 3)$  and then rotate the figure  $270^\circ$ . Graph and label the image points, and write their coordinates below. Then, write the algebraic rule for the transformation.

$J'$  \_\_\_\_\_  $K'$  \_\_\_\_\_

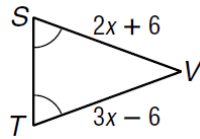
$L'$  \_\_\_\_\_  $M'$  \_\_\_\_\_

Write the algebraic rule for the rotation  $270^\circ$ :

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27. Find the value of  $x$ .



28. Graph  $\triangle ABC$  with  $A(5, -3)$ ,  $B(2, -4)$ , and  $C(1, 1)$ , then graph the image of  $\triangle ABC$  after the translation of  $\langle 4, 1 \rangle$  then reflection over the  $x$ -axis. Label all your points then, write the coordinates of the final image below.

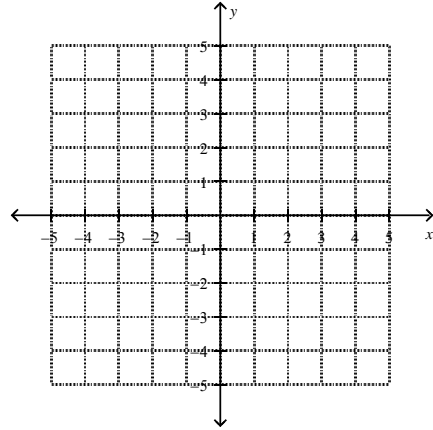
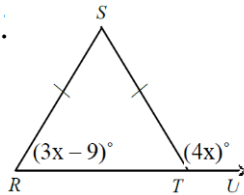


Image \_\_\_\_\_

29.  $\triangle SAM \cong \triangle LET$ . If  $SA = x^2 + 3x$ ,  $LE = x + 35$  and  $ET = 34$ . Find  $SA$ .

30. Find the value of  $x$ .



31. Solve for  $x$ . (hint: use logs)

a.  $20^{-6x} + 6 = 55$

b.  $5 \cdot 6^{3x} = 20$

32. Solve the inequality and write your answer in set notation.  $0 \geq 3x^2 - 2x - 5$

33. Solve for  $x$ .  $0 = x^2 - 4x - 8$

34. For each function, find the domain, range, and asymptote. Also, explain how the function is transformed from the parent graph.

a.  $f(x) = 3^{x+2} - 4$

Domain: \_\_\_\_\_

Range: \_\_\_\_\_

Asymptote: \_\_\_\_\_

Explain how graph changed from parent: \_\_\_\_\_

b.  $g(x) = \log(x + 7) - 9$

Domain: \_\_\_\_\_

Range: \_\_\_\_\_

Asymptote: \_\_\_\_\_

Explain how graph changed from parent: \_\_\_\_\_

35. Name the 5 postulates that can prove two triangles congruent. Draw a picture for each.

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