Name: Key

Study Guide: Math 2 Final Exam

Transformations

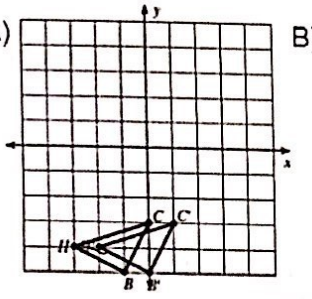
1. What are the four transformations? translate, rotate, reflect, dilate

2. Which of the transformations are isometries? translate, rotate, reflect [congruent]

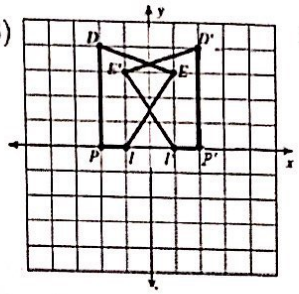
3. What does the rule $(x,y) \rightarrow (x+4, y-5)$ mean? Right 4, Down 5

4. Label each type of transformation below. Be specific! State directions, degrees (rotations), and lines of reflections.

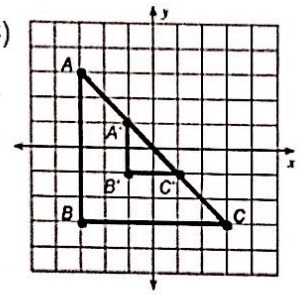
A)



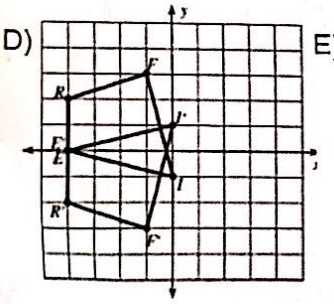
B)



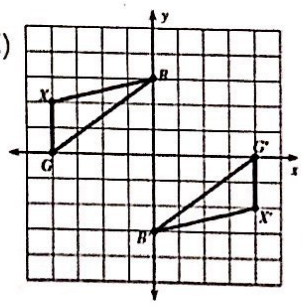
C)



D)



E)



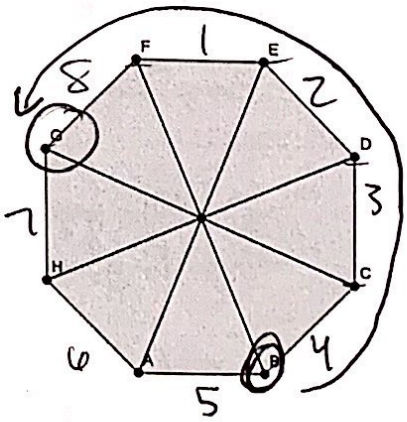
A. Translate Right 1
B. Reflect over y-axis
C. Dilate by $\frac{1}{3}$
D. Reflect over x-axis
E. Rotate 180°

5. Given the octagon *ABCDEFGH* on the right, find the image of point *B* when it is rotated 225° counter-clockwise.

$\frac{360}{8} = 45°$

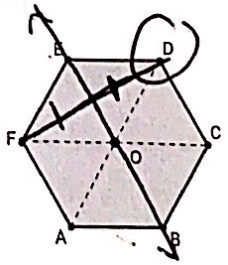
$\frac{225°}{45°} = 5$ turns

• G



6. Given the hexagon ABCDEF on the right, find the image of point F when it is reflected over the line *BE*.

• D



Quadratics

Algebra:

7. Simplify: $(4x-2)^2$

$16x^2-16x+4$

	$4x$	-2
$4x$	$16x^2$	$-8x$
-2	$-8x$	4

8. Simplify: $2\sqrt{60}$

$2 \cdot 2\sqrt{3 \cdot 5}$

$4\sqrt{15}$

60 = 3 · 20 = 3 · 2 · 10 = 3 · 2 · 2 · 5

9. Factor: x^2+5x+4

$(x+4)(x+1)$

10. Factor: x^2-16

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

11: Factor: $2x^2-x-3$

$(x+1)(2x-3)$

12. Factor: $8x^2-16x+6$

$8(x^2-2x+1)$

$8(x-1)(x-1)$

13: What is the quadratic formula?

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

14. Solve: $2x^2-162=0$

$2x^2=162$

$x^2=81$

$x=\pm 9$

15. Solve: $3x^2+x-6=0$

$$x=\frac{-1\pm\sqrt{(1)^2-4(3)(-6)}}{2(3)}=\frac{-1\pm\sqrt{73}}{6}$$

$x=\frac{-1\pm\sqrt{73}}{6}$

16. Solve $2x^2-7x-4=0$

$(2x+1)(x-4)=0$

$x=-1/2 \quad x=4$

17. Solve $2(x-1)^2=64$

$(x-1)^2=32$

$x-1=\sqrt{32}$

$x=\sqrt{32}-1$

32 = 2 · 16 = 2 · 4 · 4

$x=\pm 4\sqrt{2}-1$

18. Solve $x^2-5x+9=0$

$$x=\frac{5\pm\sqrt{(-5)^2-4(1)(9)}}{2(1)}=\frac{5\pm\sqrt{-11}}{2}$$

$x=\frac{5\pm i\sqrt{11}}{2}$

16. How and when do you need to use imaginary numbers in your answers? (Ex: $3x^2+2x+10=0$)

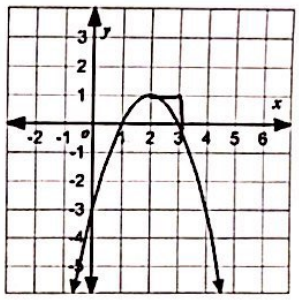
* When it does not cross the x-axis
* When there is a negative under the radical

raphing:

17. Write a vertex form equation for a parabola shifted 3 units left and 8 units down.

$(x+3)^2-8$

18. Write an equation in vertex form for the graph on the right:



$-(x-2)^2+1$

19. What are the domain and range of the graph?

D: $(-\infty, \infty)$

R: $[-\infty, 1]$

20. Complete the square to write an equation in vertex form the parabola given by $y = x^2 - 6x + 5$.

$(x-3)^2-4$

$x^2-6x+5-9$

$\frac{-6}{2}=(-3)^2=9$

21. Put $y = x^2 + 5x - 1$ into vertex form.

$\frac{5}{2}=(2.5)^2=6.25$

$(x+2.5)^2-7.25$

Square Root and Inverse Functions

Algebra:

21. Solve: $\frac{x}{2}=\frac{x-4}{3}$

$3x=2x-8$

$x=-8$

22. Solve: $\sqrt{2x-1}=3$

$2x-1=9$

$2x=10$

$x=5$ ✓

23. Solve: $\sqrt{x+12}=x$

$x^2=x+12$

$x^2-x-12=0$

$(x-4)(x+3)$

$x=4$ ✓

$x=-3$ xES!

24. Solve $\frac{x}{2}=\frac{3}{x+1}$

$6=x(x+1)$

$6=x^2+x$

$0=x^2+x-6$

$0=(x+3)(x-2)$

✓ $x=3$ $x=2$

24. a) In an inverse variation as x increases, what happens to y? decreases

b) The volume V of gas varies inversely to the pressure P. The volume of a gas is 200 cm^3 under pressure of 32 kg/cm^2. What will be its volume under pressure of 40 kg/cm^2?

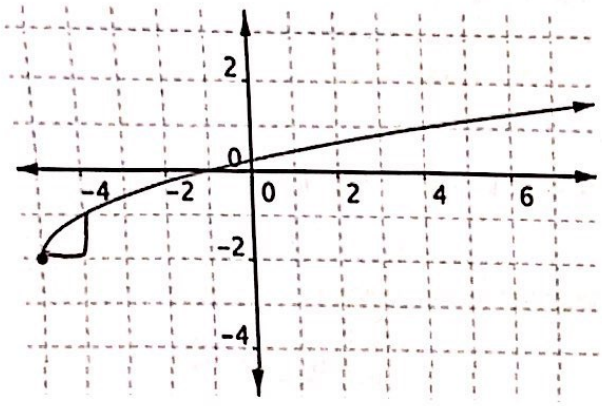
$V=\frac{K}{P}$ $200=\frac{K}{32}$ $V=\frac{6400}{P}$

$K=6400$ $V=\frac{6400}{40}$

$V=160\ cm^3$

Graphing:

25. a) Write an equation for the graph below.

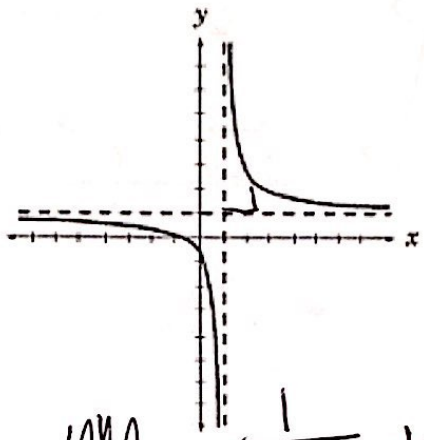


$y =$ $\sqrt{x+5} - 2$

b) What are the domain and range?

D: $[-5, \infty)$ R: $[-2, \infty)$

26. a) Write an equation for the graph below.



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

b) What are the asymptotes?

$x =$ 1 and $y =$ 1

Fundamentals of Geometry & Similarity

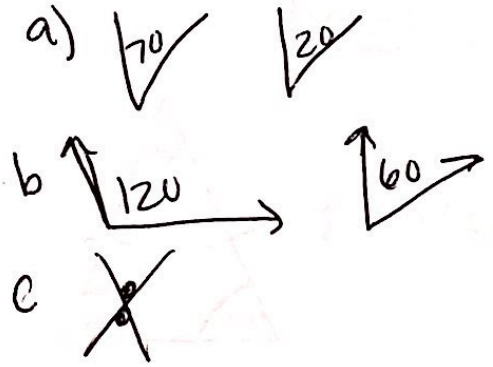
---

27. Draw an example of each of the following:

a) complementary angles
add up to 90°

b) supplementary angles
add up to 180°

c) vertical angles
are congruent



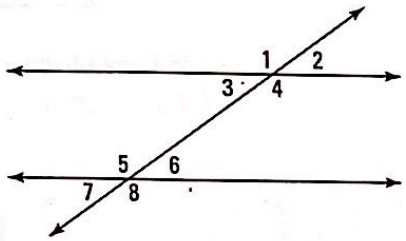
28. Using the image on the right…

a) If $m\angle 3 = 56°$ and $m\angle 6 = (3x + 2)°$, find x.

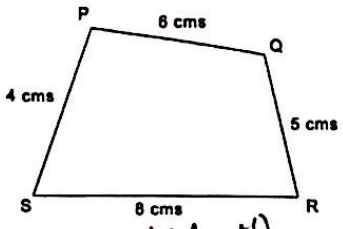
$56 = 3x + 2$ $x = 18$

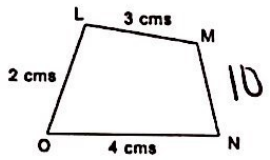
b) If $m\angle 3 = 56°$ and $m\angle 5 = (6y - 14)°$, find y.

$56 + 6y - 14 = 180$
$6y + 42 = 180$
$y = 23$



29. Are the figures below similar? If so, complete the similarity statement and state the scale factor.





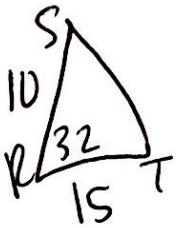
☐ Yes, □PQRS ~ □ LMNO by a scale factor of 2.

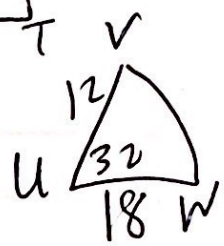
☐ No, the figures are not similar.

30. In ΔRST, $RS = 10$, $RT = 15$, and $m\angle R = 32°$. In ΔUVW, $UV = 12$, $UW = 18$, and $m\angle U = 32°$. Determine whether the triangles are similar. If so, write a similarity statement and determine the scale factor.

$\frac{10}{12} \stackrel{?}{=} \frac{15}{18}$ ✓

- ☐ Yes, Δ RST ~ Δ UVW by a scale factor of 5/6.
- ☐ No, the figures are not similar.



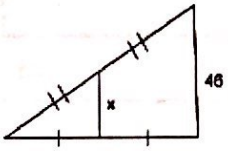


31. What are the 3 postulates for determining similarity? AAA SAS SSS

*Sides Proportional

32. Find the value of x in the figure on the right.

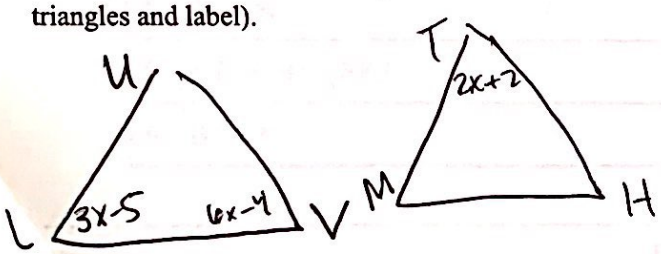
a) $x =$ 23 $\quad 2x = 46$



Triangle Congruence

---

33. Given that $\Delta LUV \cong \Delta MTH$, $m\angle L = 3x - 5$, $m\angle V = 6x - 4$, and $m\angle T = 2x + 2$. Find the value of x. (Hint: Draw the triangles and label).



$3x - 5 + 6x - 4 + 2x + 2 = 180$

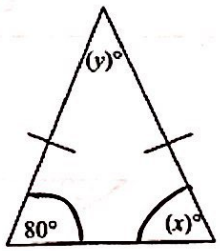
$11x - 7 = 180$

$x = 17$

34. Find the value of x and y in the figure.

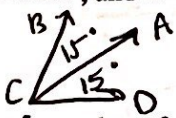
$80 = x$

$y = 20$



Isosceles △

35. $\overline{AC}$ bisects $\angle BCD$, and $m\angle BCA = 15°$. What is the measure of $\angle BCD$? How do you know?



30° Bisects cuts in half.

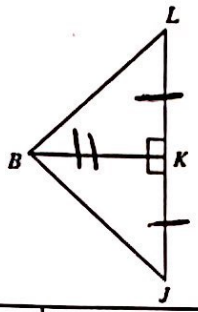
36. What are the 5 postulates for proving triangle congruence?

SAS SSS ASA AAS HL

37. Complete the proof below.

Given:
∠BKJ and ∠BKJ are right angles,
K is the midpoint of LJ

Prove:
LB ≅ JB

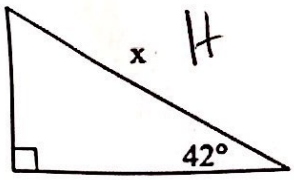


Statements	Justifications
1. - ∠BKL and ∠BKJ are right angles - K is the midpoint on LJ	1. Given
2. ∠BKL ≅ ∠BKJ	2. Right angles are congruent
3. $\overline{LK} \cong \overline{KJ}$	3. Definition of midpoint
4. BK = BK	4. Reflexive Property
5. $\triangle JKM \cong \triangle BKJ$	5. SAS
6. LB = JB	6. CPCTC

Trigonometry

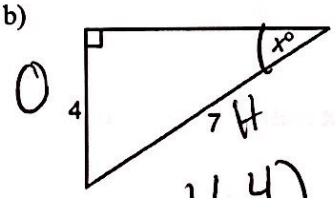
38. Solve for x in the right triangles below.

a)



$\cos(42) = \frac{20}{x}$ $\quad x = 26.91$

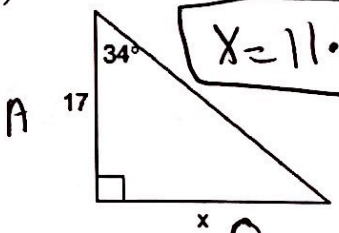
b)



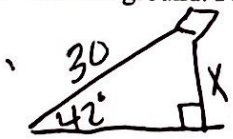
$\sin^{-1}\left(\frac{4}{7}\right) = x$ $\quad x = 34.85^\circ$

c)

$\tan(34) = \frac{x}{17}$ $\quad x = 11.47$

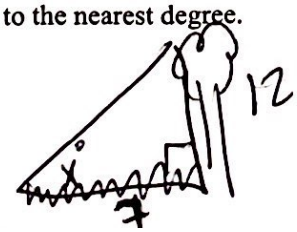


39. Juan is flying his kite on the football field. There is 30 meters of string between Juan and his kite. The string makes an angle of 42° with the ground. Find, to the nearest meter, how far above the ground the kite is flying.



$\sin(42) = \frac{x}{30}$ $\quad x = 20.07$ meters

40. Find the angle of elevation of the sun from the ground to the top of a tree when a tree that is 12 feet tall casts a shadow 7 feet long. Round to the nearest degree.



$\tan^{-1}\left(\frac{12}{7}\right) = x$ $\quad x = 59.74^\circ$