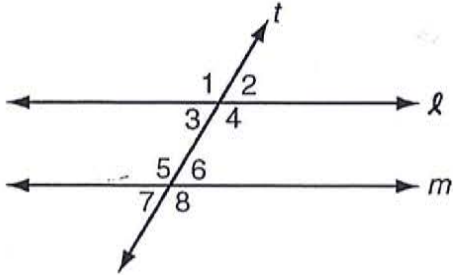


Geometry Midterm Review

Name: KEY

Date: _____

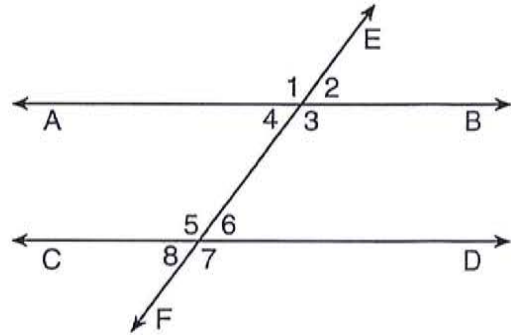
1. In the accompanying diagram, line ℓ is parallel to line m , and line t is a transversal.



Which must be a true statement?

- (1) $m\angle 1 + m\angle 4 = 180$ (2) $m\angle 1 + m\angle 8 = 180$
 (3) $m\angle 3 + m\angle 6 = 180$ (4) $m\angle 2 + m\angle 5 = 180$

2. Transversal \overleftrightarrow{EF} intersects \overleftrightarrow{AB} and \overleftrightarrow{CD} , as shown in the diagram below.



Which statement could always be used to prove $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$?

- (1) $\angle 2 \cong \angle 4$
 (2) $\angle 7 \cong \angle 8$
 (3) $\angle 3$ and $\angle 6$ are supplementary
 (4) $\angle 1$ and $\angle 5$ are supplementary

3. When two parallel lines are cut by a transversal, which angles are *not* always congruent?

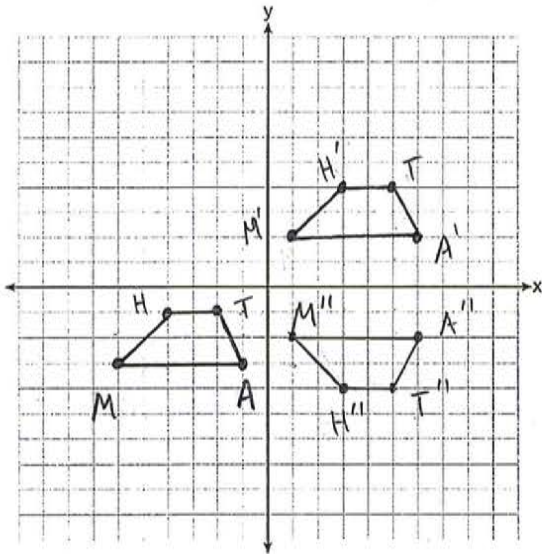
(1) a pair of alternate interior angles ✓

(2) a pair of alternate exterior angles ✓

(3) two interior angles on the same side of the transversal

(4) two corresponding angles ✓

4. Quadrilateral *MATH* has coordinates $M(-6, -3)$, $A(-1, -3)$, $T(-2, -1)$, and $H(-4, -1)$. The image of quadrilateral *MATH* after the composition $r_{x\text{-axis}} \circ T_{7,5}$ is quadrilateral $M''A''T''H''$. State and label the coordinates of $M''A''T''H''$.



$$M'' (1, -2)$$

$$A'' (4, -2)$$

$$T'' (3, -4)$$

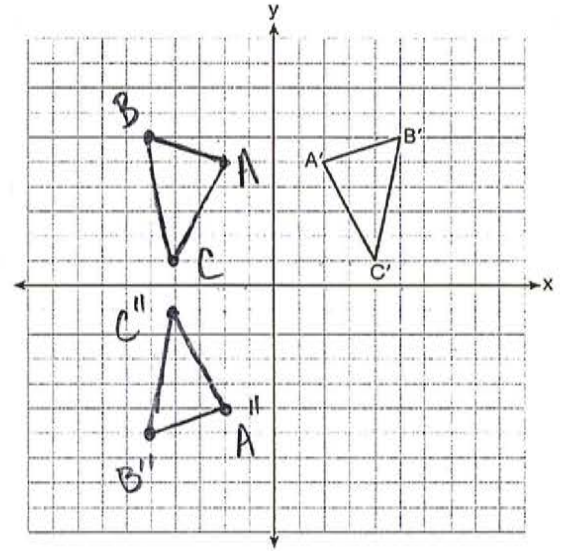
$$H'' (2, -4)$$

5. The graph below shows $\triangle A'B'C'$, the image of $\triangle ABC$ after it was reflected over the y -axis.

Graph and label $\triangle ABC$, the pre-image of $\triangle A'B'C'$.

Graph and label $\triangle A''B''C''$, the image of $\triangle A'B'C'$ after it is reflected through the origin.

State a single transformation that will map $\triangle ABC$ onto $\triangle A''B''C''$.



$r_{x\text{-axis}}$

Dilation

6. Under the transformation $(x, y) \rightarrow (2x, 2y)$, which property is *not* preserved?

- (1) distance
(2) orientation
(3) parallelism
(4) angle measure

7. If $\triangle ABC$ and its image, $\triangle A'B'C'$, are graphed on a set of axes, $\triangle ABC \cong \triangle A'B'C'$ under each transformation *except*

- (1) D_2
(2) R_{90°
(3) $r_{y=x}$
(4) $T_{(-2,3)}$

Size Changes

8. Which figure has 60° rotational symmetry?

- (1) square 90
(2) equilateral triangle 120
(3) regular octagon 45
(4) regular hexagon 60

9. Which figure has 120° rotational symmetry?

- (1) rhombus 180
(2) regular pentagon 72
(3) square 90
(4) equilateral triangle 120

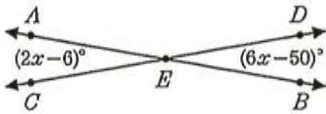
10. If $\triangle A'B'C'$ is the image of $\triangle ABC$, under which transformation will the triangles *not* be congruent?

- (1) reflection over the x -axis
(2) translation to the left 5 and down 4
(3) dilation centered at the origin with scale factor 2
(4) rotation of 270° counterclockwise about the origin

11. After a reflection over a line, $\triangle A'B'C'$ is the image of $\triangle ABC$. Explain why triangle ABC is congruent to triangle $A'B'C'$.

Reflections are rigid motions which preserve distance & \angle measure

12. In the accompanying diagram, \overleftrightarrow{AB} and \overleftrightarrow{CD} intersect at E . Angles AEC and DEB measure $2x - 6$ and $6x - 50$, respectively. Find the value of x .



Vert \angle s are \cong

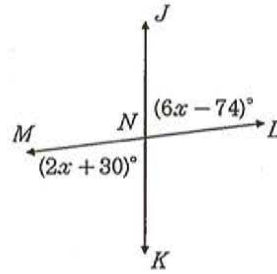
$$2x - 6 = 6x - 50$$

$$-2x \quad +50 \quad -2x \quad +50$$

$$\frac{44}{4} = \frac{4x}{4}$$

$$\boxed{x = 11}$$

13. In the accompanying diagram, lines \overleftrightarrow{JK} and \overleftrightarrow{LM} intersect at N , $m\angle JNL = 6x - 74$, and $m\angle MNK = 2x + 30$. What is the value of x ?



Vertical \angle s are \cong

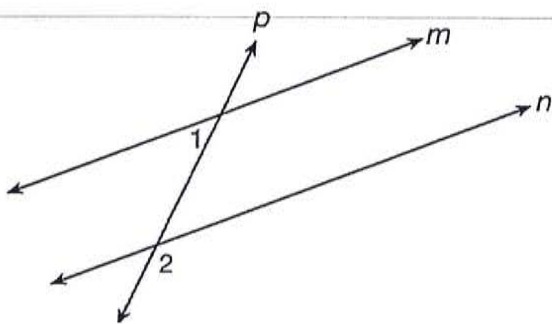
$$2x + 30 = 6x - 74$$

$$-2x \quad \quad \quad +74$$

$$\frac{104}{4} = \frac{4x}{4}$$

$$\boxed{x = 26}$$

14. As shown in the diagram below, lines m and n are cut by transversal p .



If $m\angle 1 = 4x + 14$ and $m\angle 2 = 8x + 10$, lines m and n are parallel when x equals

- (1) 1 (2) 6 (3) 13 (4) 17

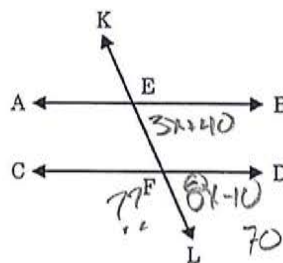
$$4x + 14 + 8x + 10 = 180$$

$$12x + 24 = 180$$

$$12x = 156$$

$$\boxed{x = 13}$$

15. In the accompanying diagram, \overleftrightarrow{AB} is parallel to \overleftrightarrow{CD} ; transversal \overleftrightarrow{KL} intersects \overleftrightarrow{AB} and \overleftrightarrow{CD} at E and F , respectively; $m\angle BEF = 3x + 40$; and $m\angle DFL = 8x - 10$. Find $m\angle CFL$.



$$3x + 40 = 8x - 10$$

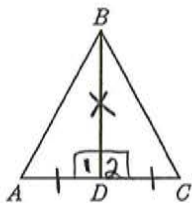
$$50 = 5x$$

$$x = 10$$

$$\boxed{m\angle CFL = 110}$$

16. Given: $\triangle ABC$, \overline{BD} is both the median and the altitude of \overline{AC} .

Prove: $\overline{BA} \cong \overline{BC}$



S

- ① \overline{BD} is a median
 \overline{BD} is an altitude

② $\overline{BD} \perp \overline{AC}$

③ $\angle 1$ & $\angle 2$ are rt \angle s

④ $\angle 1 \cong \angle 2$

⑤ D is a mdpt of \overline{AC}

⑥ $\overline{AD} \cong \overline{CD}$

⑦ $\overline{BD} \cong \overline{BD}$

⑧ $\triangle ABD \cong \triangle CBD$

⑨ $\overline{BA} \cong \overline{BC}$

R

① Given

② Altitudes create \perp lines

③ \perp lines form rt \angle s

④ All rt \angle s are \cong

⑤ Medians create mdpt

⑥ Mdpt creates 2 \cong segments

⑦ Reflexive

⑧ SAS

⑨ Corresponding Parts of \cong \triangle s are \cong

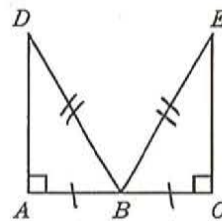
17. In the accompanying diagram, B is the midpoint of \overline{AC} , $\overline{DA} \perp \overline{AC}$, $\overline{EC} \perp \overline{AC}$, and $\overline{DB} \cong \overline{EB}$. Which method of proof may be used to prove $\triangle DAB \cong \triangle ECB$?

(1) SAS \cong SAS

(2) ASA \cong ASA

(3) HL \cong HL

(4) AAS \cong AAS



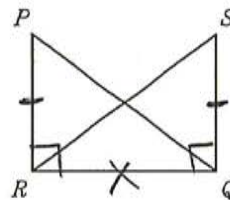
18. In the accompanying diagram, $\overline{PR} \cong \overline{SQ}$, $\overline{PR} \perp \overline{RQ}$, and $\overline{SQ} \perp \overline{RQ}$. Which statement can be used to prove that $\triangle PQR \cong \triangle SRQ$?

(1) AAS \cong AAS

(2) SAS \cong SAS

(3) HL \cong HL

(4) SSS \cong SSS



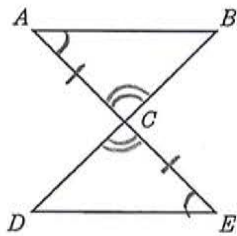
19. In the accompanying diagram, \overline{ACE} , \overline{BCD} , \overline{AB} , and \overline{DE} , $\angle A \cong \angle E$, and C is the midpoint of \overline{AE} . Which theorem justifies $\triangle ABC \cong \triangle EDC$?

(1) $SSS \cong SSS$

(2) $SAS \cong SAS$

(3) $ASA \cong ASA$

(4) $SSA \cong SSA$



20. In the accompanying diagram of isosceles triangle ABC , $\angle ACB$ is the vertex angle, $\overline{CM} \perp \overline{AB}$, and M is the midpoint of \overline{AB} .

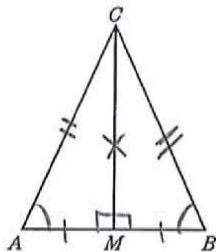
Which statement can *not* be used to justify $\triangle ACM \cong \triangle BCM$?

(1) $HL \cong HL$

(2) $AAS \cong AAS$

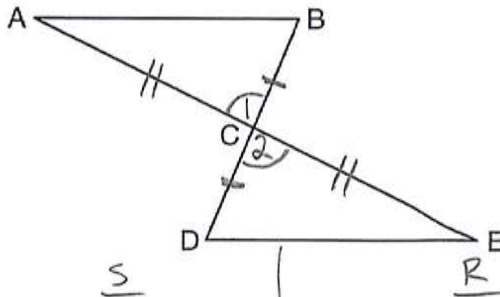
(3) $SSS \cong SSS$

(4) $AAA \cong AAA$



21. Given: $\triangle ABC$ and $\triangle EDC$, C is the midpoint of \overline{BD} and \overline{AE}

Prove: $AB = ED$



① C is mdpt \overline{BD} & \overline{AE}

② $\overline{BC} \cong \overline{DC}$
 $\overline{AC} \cong \overline{EC}$

③ $\angle 1 \cong \angle 2$

④ $\triangle ABC \cong \triangle EDC$

⑤ $AB = ED$

① Given

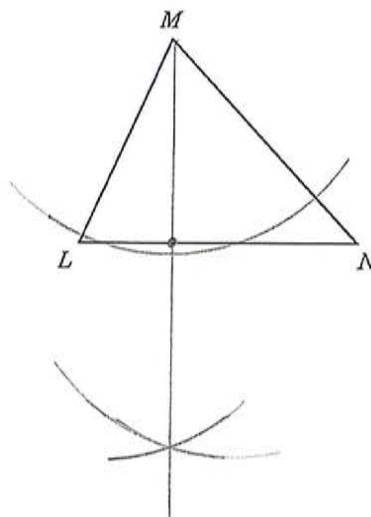
② A mdpt creates
2 \cong segment

③ Vertical \angle s are \cong

④ SAS

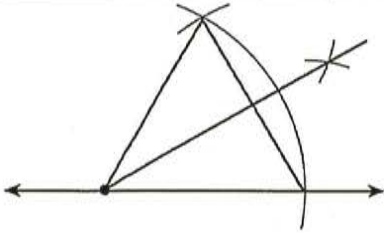
⑤ Corresponding Parts
of \cong \triangle s are =

22. Construct the altitude of $\triangle LMN$ from M to \overline{LN} .

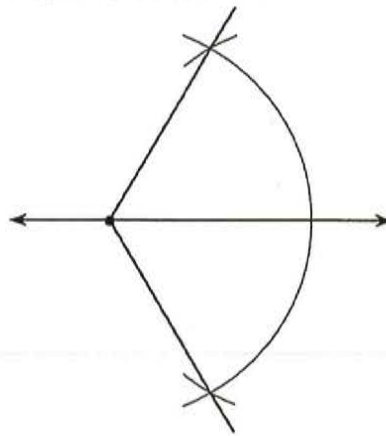


23. Which diagram shows the construction of a 45° angle?

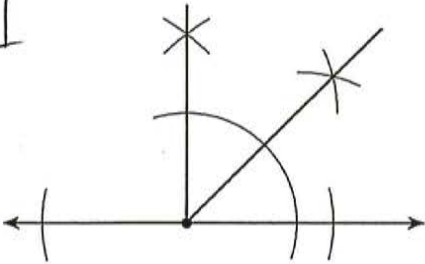
(1)



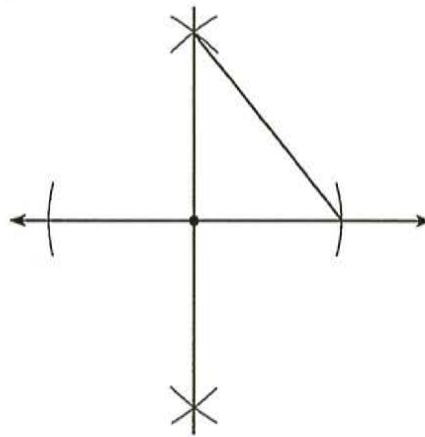
(2)



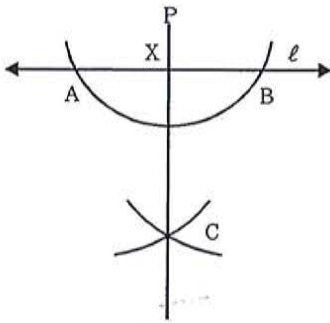
(3)



(4)



24. The diagram shows the construction of dropping perpendicular \overline{PX} from point P to line ℓ . The arc drawn from point P intersects line ℓ at A and B , and the arcs drawn from points A and B intersect \overline{PX} at C .



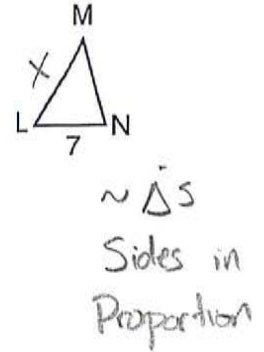
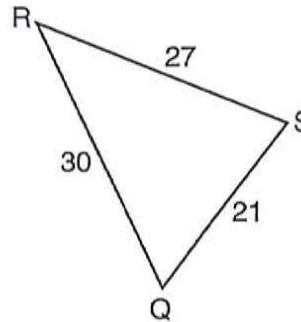
Which statement is *not* always true about this construction?

- (1) $PA = PB$ ✓ (2) $AX = BX$ ✓
 (3) $PX = CX$ ✗ (4) $AC = BC$ ✓

25. To locate a point equidistant from the vertices of a triangle, construct *Circumcenter*

- (1) the perpendicular bisectors of the sides
 (2) the angle bisectors
 (3) the altitudes
 (4) the medians

26. In the accompanying diagram, $\triangle QRS$ is similar to $\triangle LMN$, $RQ = 30$, $QS = 21$, $SR = 27$, and $LN = 7$. What is the length of \overline{ML} ?



$\triangle QRS$
 $\triangle LMN$

$$\frac{30}{x} = \frac{21}{7}$$

$$\frac{21x}{21} = \frac{210}{21}$$

$$x = 10$$

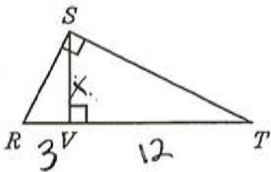
27. If two angles of one triangle are congruent, respectively, to two angles of another triangle, then these triangles must be

- (1) isosceles (2) similar
 (3) congruent (4) equilateral

28. Which is *not* a property of all similar triangles?

- (1) The corresponding angles are congruent. ✓
- (2) The corresponding sides are congruent. ✗
- (3) The perimeters are in the same ratio as the corresponding sides. ✓
- (4) The altitudes are in the same ratio as the corresponding sides. ✓

29. In the accompanying diagram, \overline{SV} is the altitude to hypotenuse \overline{RT} of right triangle RST . If $RV = 3$ and $VT = 12$, find the length of \overline{SV} .

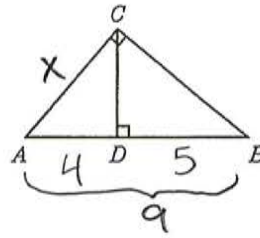


$$\frac{x}{3} = \frac{12}{x}$$

$$x^2 = 36$$

$$x = 6$$

30. In right triangle ABC , $m\angle C = 90^\circ$ and altitude \overline{CD} is drawn to hypotenuse \overline{AB} . If $AD = 4$ and $DB = 5$, find AC .



$$\frac{x}{4} = \frac{9}{x}$$

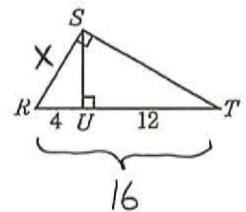
$$x^2 = 36$$

$$x = 6$$

31. In the accompanying diagram, $\triangle RST$ is a right triangle, \overline{SU} is the altitude to hypotenuse \overline{RT} , $RU = 4$, and $UT = 12$.

What is the length of \overline{RS} ?

- (1) 8
- (2) $\sqrt{48}$
- (3) $\sqrt{160}$
- (4) 24



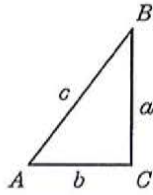
$$\frac{x}{4} = \frac{16}{x}$$

$$x^2 = 64$$

$$x = 8$$

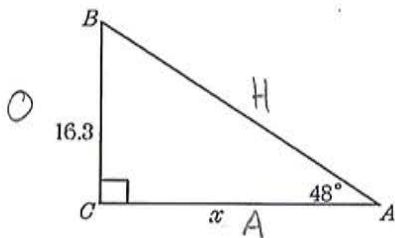
32. In the accompanying diagram of right triangle ABC , $\angle C$ is a right angle. Which equation is valid for $\triangle ABC$?

~~(1) $\cos A = \frac{c}{b}$~~ ~~(2) $\tan A = \frac{b}{a}$~~ \times
 $\boxed{(3) \sin A = \frac{a}{c}}$ ~~(4) $\cos B = \frac{a}{b}$~~ \times



33. In the accompanying diagram of right triangle ABC , $m\angle C = 90$, $m\angle BAC = 48$, $AC = x$, and $CB = 16.3$.

Which equation could be used to find the length of AC ?



~~(1) $\sin 48 = \frac{16.3}{x}$~~ ~~(2) $\cos 48 = \frac{x}{16.3}$~~ \times
 $\boxed{(3) \tan 48 = \frac{16.3}{x}}$ (4) $\tan 48 = \frac{x}{16.3}$

34. Which value of x satisfies the equation $\sin 40^\circ = \cos x$?

(1) 20° (2) 40° $\boxed{(3) 50^\circ}$ (4) 80°

$$40 + x = 90$$

$$x = 50$$

35. If $\cos(2x - 25)^\circ = \sin 55^\circ$, find the value of x .

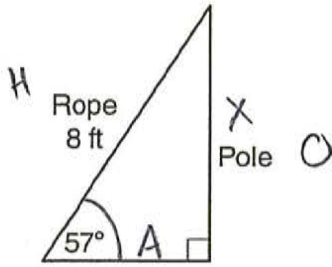
$$2x - 25 + 55 = 90$$

$$2x + 30 = 90$$

$$2x = 60$$

$$x = 30$$

36. An 8-foot rope is tied from the top of a pole to a stake in the ground, as shown in the diagram below.



If the rope forms a 57° angle with the ground, what is the height of the pole, to the nearest tenth of a foot?

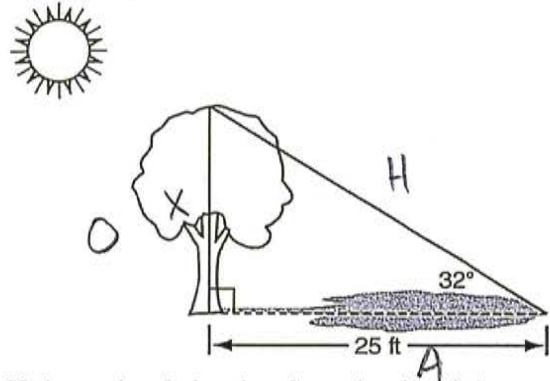
- (1) 4.4 (2) 6.7 (3) 9.5 (4) 12.3

$$\sin 57 = \frac{X}{8}$$

$$X = 8 \cdot \sin 57$$

$$X = 6.7$$

37. A tree casts a 25-foot shadow on a sunny day, as shown in the diagram below.



If the angle of elevation from the tip of the shadow to the top of the tree is 32° , what is the height of the tree to the nearest tenth of a foot?

- (1) 13.2 (2) 15.6 (3) 21.2 (4) 40.0

$$\tan 32 = \frac{X}{25}$$

$$X = 25 \cdot \tan 32$$

$$X = 15.6$$

38. The expression $\sqrt{27} + \sqrt{12}$ is equal to

- (1) $13\sqrt{3}$ (2) $5\sqrt{3}$ (3) $5\sqrt{6}$ (4) $\sqrt{39}$

$$\sqrt{9 \cdot 3} + \sqrt{4 \cdot 3}$$

$$3\sqrt{3} + 2\sqrt{3}$$

$$5\sqrt{3}$$

39. The expression $\sqrt{200}$ is equivalent to

(1) $25\sqrt{8}$

(2) $100\sqrt{2}$

(3) $2\sqrt{10}$

(4) $10\sqrt{2}$

$$\sqrt{100} \cdot \sqrt{2}$$

$$10\sqrt{2}$$

40. Which set of numbers represents the lengths of the sides of a right triangle?

(1) {7, 8, 9}

(2) {7, 8, 10}

(3) {6, 8, 10}

(4) {6, 8, 9}

{3, 4, 5} times 2

41. Which set of numbers could not represent the lengths of the sides of a right triangle?

(1) {3, 4, 5} ✓

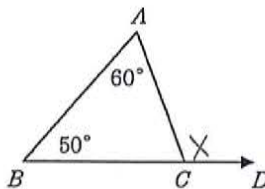
(2) {6, 9, 12}

(3) {5, 12, 13} ✓

(4) {8, 15, 17} ✓

Pythagorean Triples

42. In the accompanying diagram, $\angle ACD$ is an exterior angle of $\triangle ABC$. If $m\angle A = 60$ and $m\angle B = 50$, find $m\angle ACD$.



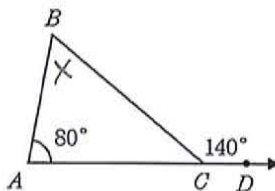
Ext. \angle Theorem

$$X = 50 + 60$$

$$X = 110$$

$$m\angle ACD = 110$$

43. In the diagram shown, $m\angle BCD = 140$ and $m\angle BAC = 80$. Find $m\angle ABC$.



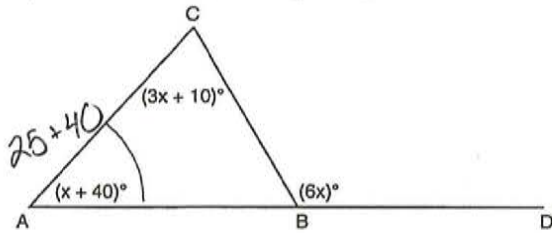
$$140 = 80 + X$$

$$\begin{array}{r} -80 \\ -80 \end{array}$$

$$X = 60$$

$$m\angle ABC = 60$$

44. In the diagram of $\triangle ABC$ below, \overline{AB} is extended to point D .



If $m\angle CAB = x + 40$, $m\angle ACB = 3x + 10$, and $m\angle CBD = 6x$, what is $m\angle CAB$?

- (1) 13 (2) 25 (3) 53 (4) 65

$$x + 40 + 3x + 10 = 6x$$

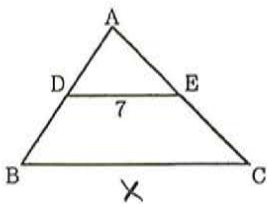
$$4x + 50 = 6x$$

$$50 = 2x$$

$$x = 25$$

$$m\angle CAB = 65$$

45. In the accompanying diagram of scalene triangle $\triangle ABC$, D and E are the midpoints of \overline{AB} and \overline{AC} , respectively, and $\overline{DE} = 7$. Find the length of \overline{BC} .



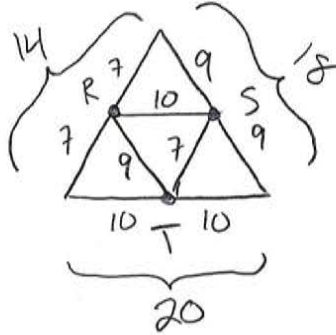
Midsegments
2 (small) = big

$$2(7) = x$$

$$x = 14$$

$$\overline{BC} = 14$$

46. Points R , S , and T are the midpoints of the sides of a triangle whose sides have lengths 14, 18, and 20. Find the perimeter of $\triangle RST$.

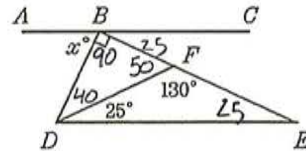


$$7 + 9 + 10$$

$$26$$

$$P(\triangle RST) = 26$$

47. In the accompanying diagram, $\overline{ABC} \parallel \overline{DE}$, $m\angle FDE = 25$, $m\angle DFE = 130$, and $m\angle ABD = x$. What is the value of x ?

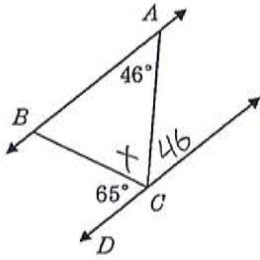


$$x + 90 + 25 = 180$$

$$x + 115 = 180$$

$$x = 65$$

48. In the accompanying diagram, \overleftrightarrow{AB} is parallel to \overleftrightarrow{CD} , $m\angle BAC = 46$, and $m\angle BCD = 65$. Find the measure of $\angle ACB$.



$$65 + x + 46 = 180$$

$$x + 111 = 180$$

$$x = 69$$

$$m\angle ACB = 69$$

49. If the measure of the angles of a triangle are represented by $2x$, $4x$, and $6x$, then the triangle is

- (1) right (2) obtuse
(3) acute (4) equiangular

$$2x + 4x + 6x = 180$$

$$12x = 180$$

$$x = 15$$

$$2x: 30$$

$$4x: 60$$

$$6x: 90$$

50. If the measures of the angles of a triangle are represented by $x + 30$, $4x + 30$, and $10x - 30$, the triangle must be

- (1) isosceles (2) obtuse
(3) right (4) scalene

$$x + 30 + 4x + 30 + 10x - 30 = 180$$

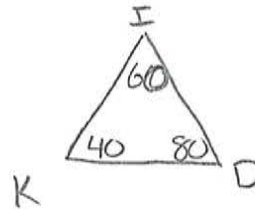
$$15x + 30 = 180$$

$$15x = 150$$

$$x = 10$$

$$40, 70, 70$$

51. In $\triangle KID$, $m\angle K = 40$ and $m\angle D = 80$. Which side of $\triangle KID$ is the shortest?

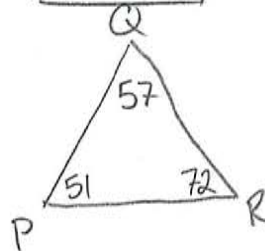


Shortest Side \rightarrow Smallest \angle
Longest Side \rightarrow Largest \angle

$$\overline{ID}$$

52. In $\triangle PQR$, $m\angle P = 51$ and $m\angle Q = 57$. Which expression is true?

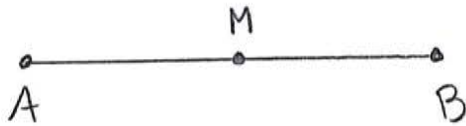
- (1) $QR > PQ$ X (2) $PR > PQ$ X
(3) $PQ > QR$ (4) $PQ > QR$



$$PQ > PR > QR$$

53. If M is the midpoint of \overline{AB} , then which statement is false?

- (1) $\frac{AB}{2} = MB$ ✓ (2) $AM = MB$ ✓
 (3) $AB - MB = AM$ ✓ (4) $AM + AB = MB$ ✗



54. In which figure is $\triangle A'B'C'$ a reflection of $\triangle ABC$ in line ℓ ?

- (1) (2) (3) (4)

55. What is the image of point $(4, 5)$ after a reflection in the y -axis?

\uparrow y -axis \rightarrow x changes signs

$$\boxed{(-4, 5)}$$

56. The coordinates of any point (x, y) after a reflection in the x -axis can *always* be represented by

- (1) (x, y) (2) $(-x, y)$
 (3) $(x, -y)$ (4) $(-x, -y)$

\uparrow x -axis \rightarrow y changes signs

39.
Answer: 4
40.
Answer: 3
41.
Answer: 2
42.
Answer: 110
43.
Answer: 60
44.
Answer: 4
45.
Answer: 14
46.
Answer: 26
47.
Answer: 65
48.
Answer: 69
49.
Answer: 1
50.
Answer: 1
51.
Answer: \overline{D}
52.
Answer: ~~4~~ 3
53.
Answer: 4
54.
Answer: 2
55.
Answer: $(-4, 5)$
56.
Answer: 3

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<p>1. Answer: 4</p> <p>2. Answer: 3</p> <p>3. Answer: 3</p> <p>4. Answer: $M''(1, -2)$, $A''(6, -2)$, $T''(5, -4)$, and $H''(3, -4)$ are stated and labeled. Appropriate work is shown.</p> <p>5. Answer: $\triangle ABC$ and $\triangle A''B''C''$ are graphed and labeled correctly, and a reflection over the x-axis is stated.</p> <p>6. Answer: 1</p> <p>7. Answer: 1</p> <p>8. Answer: 4</p> <p>9. Answer: 4</p> <p>10. Answer: 3</p> <p>11. Answer: [answers vary] A correct explanation is written</p> <p>12. Answer: 11</p> <p>13. Answer: 26</p> <p>14. Answer: 3</p> <p>15. Answer: 110</p> <p>16. Answer: [proof]</p> <p>17. Answer: 3</p> <p>18. Answer: 2</p>	<p>19. Answer: 3</p> <p>20. Answer: 4</p> <p>21. Answer: [task]</p> <p>22. Answer: [construction]</p> <p>23. Answer: 3</p> <p>24. Answer: 3</p> <p>25. Answer: 1</p> <p>26. Answer: 10, and appropriate work is shown.</p> <p>27. Answer: 2</p> <p>28. Answer: 2</p> <p>29. Answer: 6</p> <p>30. Answer: 6</p> <p>31. Answer: 1</p> <p>32. Answer: 3</p> <p>33. Answer: 3</p> <p>34. Answer: 3</p> <p>35. Answer: 30</p> <p>36. Answer: 2</p> <p>37. Answer: 2</p> <p>38. Answer: 2</p>
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