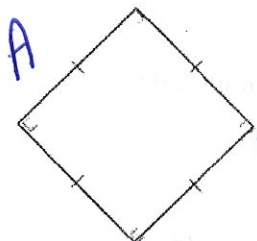# Unit 6 Test Review

1. Judging by appearance, classify the figure in as many ways as possible. (All angles are right angles.)

A

(a) rectangle, square, quadrilateral, parallelogram, rhombus
b. rectangle, square, parallelogram
c. rhombus, trapezoid, quadrilateral, square
d. square, rectangle, quadrilateral

2. Find the values of the variables and the lengths of the sides of this kite.

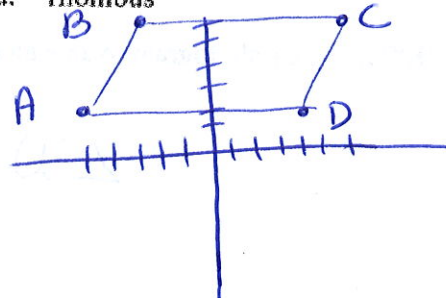C

$y - 2 = x + 2$
$y = x + 4$
$y = 13$

$2x + 2 = x + 11$
$x = 9$

C
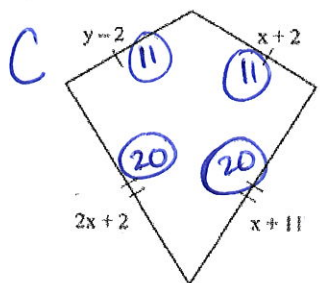
a. $x = 9, y = 13; 7, 15$
b. $x = 13, y = 9; 7, 15$
(c.) $x = 9, y = 13; 11, 20$
d. $x = 13, y = 9; 11, 11$

3. What is the most precise name for quadrilateral $ABCD$ with vertices $A(-5, 2)$, $B(-3, 6)$, $C(6, 6)$, and $D(4, 2)$?

C

a. quadrilateral   b. rectangle   (c.) parallelogram   d. rhombus
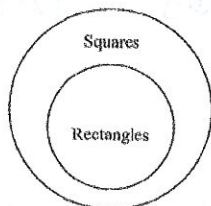
4. Which statement is true?

C

a. All quadrilaterals are rectangles.
b. All quadrilaterals are squares.
(c.) All rectangles are quadrilaterals.
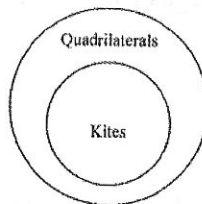d. All quadrilaterals are parallelograms.

5. Which Venn diagram is NOT correct?

B

a.
Rhombuses
Squares

b.
Squares
Rectangles

c.
Quadrilaterals
Kites

d.
Parallelograms
Rhombuses
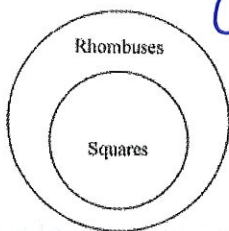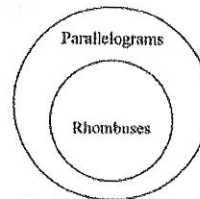
6. $ABCD$ is a parallelogram. If $m\angle CDA = 66$, then $m\angle BCD =$ __?__

C $114°$ C $180 - 66 = 114$

a. 66   b. 124   (c.) 114   d. 132

7. $ABCD$ is a parallelogram. If $m\angle DAB = 115$, then $m\angle BCD =$ __?__ $115°$

D

a. 125   b. 65   c. 75   (d.) 115

8. *LMNO* is a parallelogram. If *NM* = *x* + 15 and *OL* = 3*x* + 5, find the value of *x* and then find *NM* and *OL*.
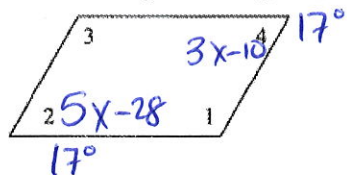
$$x + 15 = 3x + 5 \qquad NM = 20$$
$$10 = 2x \qquad OL = 20$$
$$5 = x$$

9. For the parallelogram, if $m\angle 2 = 5x - 28$ and $m\angle 4 = 3x - 10$, find $m\angle 3$. The diagram is not to scale.

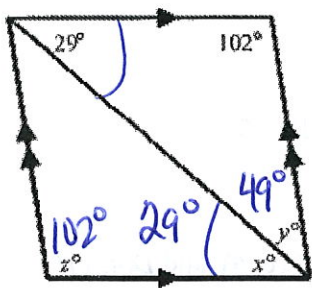$$5x - 28 = 3x - 10$$
$$2x = 18$$
$$x = 9$$
$$m\angle 3 = 180 - 17 = 163°$$

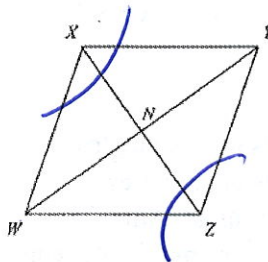10. Find the values of the variables in the parallelogram. The diagram is not to scale.
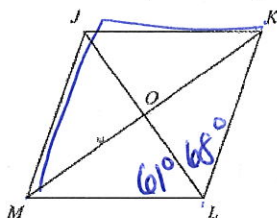
$$y = 49°$$
$$x = 29°$$
$$z = 102°$$

11. *WXYZ* is a parallelogram. Name an angle congruent to $\angle WZY$.

$$\angle WXY$$

12. In the parallelogram, $m\angle KLO = 68$ and $m\angle MLO = 61$. Find $m\angle KJM$. The diagram is not to scale.

$$m\angle KJM = 61 + 68 = 129°$$

13. In parallelogram *DEFG*, *DH* = *x* + 3, *HF* = 3*y*, *GH* = 4*x* − 5, and *HE* = 2*y* + 3. Find the values of *x* and *y*. The diagram is not to scale.
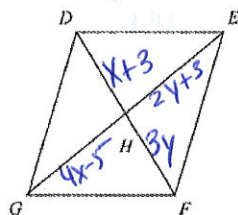
$$x + 3 = 3y \qquad\qquad 4x - 5 = 2y + 3$$
$$x = 3y - 3 \qquad\qquad 4(3y - 3) - 5 = 2y + 3$$
$$x = 6 - 3 \qquad\qquad 12y - 12 - 5 = 2y + 3$$
$$x = 3 \qquad\qquad 12y - 17 = 2y + 3$$
$$10y = 20$$
$$y = 2$$

Determine whether the following are always, sometimes or never true:

14. The diagonals of a parallelogram are perpendicular. _Sometimes (if it's a rhombus)_
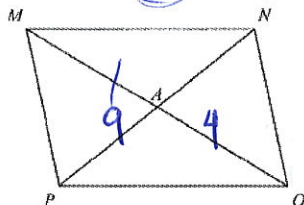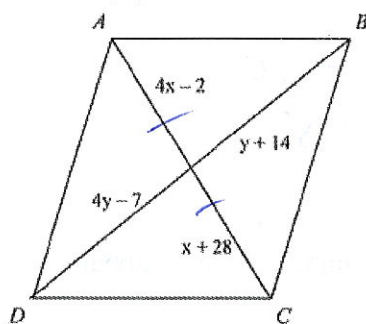
15. Both pairs of opposite angles of a trapezoid are congruent. _Never (it would have to be a ▱)_

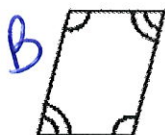16. Find AM in the parallelogram if $PN = 9$ and $AO = 4$. The diagram is not to scale.

$AM = 4$

17. Find values of x and y for which $ABCD$ must be a parallelogram. The diagram is not to scale.

$$4x - 2 = x + 28 \qquad 4y - 7 = y + 14$$
$$3x = 30 \qquad\qquad 3y = 21$$
$$x = 10 \qquad\qquad y = 7$$

18. Based on the information in the diagram, can you prove that the figure is a parallelogram? Explain.

B

   a. Yes; both pairs of opposite sides are congruent.
   b. Yes; opposite angles are congruent.
   c. No; you cannot prove that the quadrilateral is a parallelogram.
   d. Yes; two opposite sides are both parallel and congruent.

19. Based on the information given, can you determine that the quadrilateral must be a parallelogram? Explain.

Given: $\overline{XY} \cong \overline{WZ}$ and $\overline{XW} \cong \overline{YZ}$

C
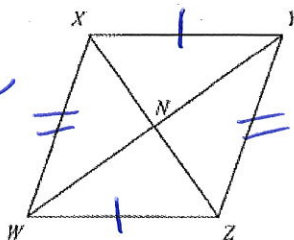
   a. No; you cannot determine that the quadrilateral is a parallelogram.
   b. Yes; two opposite sides are both parallel and congruent.
   c. Yes; opposite sides are congruent.
   d. Yes; diagonals of a parallelogram bisect each other.

20. If $ON = 5x - 4$, $LM = 4x + 7$, $NM = x - 7$, and $OL = 2y - 6$, find the values of x and y for which $LMNO$ must be a parallelogram. The diagram is not to scale.
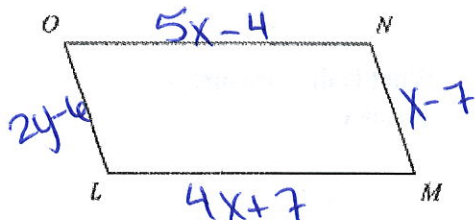
$$5x - 4 = 4x + 7 \qquad 2y - 6 = 11$$
$$\boxed{x = 11} \qquad\qquad 2y - 6 = 4$$
$$\qquad\qquad 2y = 10$$
$$\qquad\qquad \boxed{y = 5}$$

21. If $m\angle B = m\angle D = 41$, find $m\angle C$ so that quadrilateral $ABCD$ is a parallelogram. The diagram is not to scale.
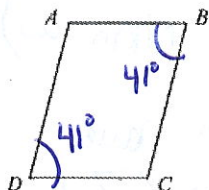
$180 - 41° = 139° = m\angle C$

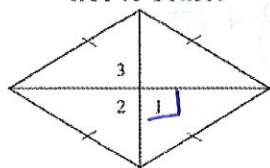22. Which statement can you use to conclude that quadrilateral $XYZW$ is a parallelogram?
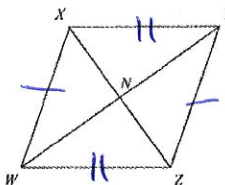
A

a. $\overline{XW} \cong \overline{YZ}$ and $\overline{XY} \cong \overline{WZ}$

b. $\overline{XW} \cong \overline{WZ}$ and $\overline{XY} \cong \overline{WZ}$

c. $\overline{YN} = \overline{NX}$ and $\overline{XN} = \overline{NY}$

d. $\overline{XW} \cong \overline{YZ}$ and $\overline{XY} \cong \overline{YZ}$

23. In the rhombus, $m\angle 1 = 6x$, $m\angle 2 = x + y$, and $m\angle 3 = 18z$. Find the value of each variable. The diagram is not to scale.

$6x = 90$
$x = 15$

$x + y = 90$
$15 + y = 90$
$y = 75$

$18z = 90$
$z = 5$

24. $DEFG$ is a rectangle. $DF = 5x - 5$ and $EG = x + 11$. Find the value of x and the length of each diagonal.

a. $x = 4$, $DF = 13$, $EG = 13$

b. $x = 4$, $DF = 15$, $EG = 18$

c. $x = 4$, $DF = 15$, $EG = 15$

d. $x = 2$, $DF = 13$, $EG = 13$

C

$5x - 5 = x + 11$
$4x = 16 \quad x = 4$

25. Which description does NOT guarantee that a quadrilateral is a parallelogram?

a. a quadrilateral with both pairs of opposite sides congruent

b. a quadrilateral with the diagonals bisecting each other

c. a quadrilateral with consecutive angles supplementary

d. quadrilateral with two opposite sides parallel

D

26. Find the values of a and b. The diagram is not to scale.
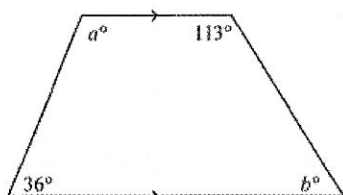
$180 - 36 = 144° = a$

$180 - 113 = b = 67°$

27. The isosceles trapezoid is part of an isosceles triangle with a 46° vertex angle. What is the measure of an acute base angle of the trapezoid? Of an obtuse base angle? The diagram is not to scale.

B

$\dfrac{180 - 46}{2} = \dfrac{134}{2} = 67$

a. 67°; 134°

b. 67°; 113°

c. 46°; 134°

d. 46°; 113°

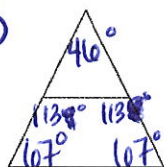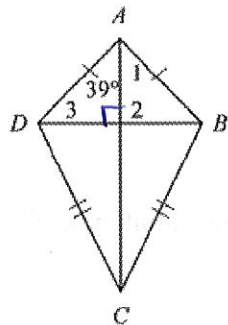28. Find $m\angle 1$ and $m\angle 3$ in the kite. The diagram is not to scale.

A
39° 1
3 2
D B
C

$m\angle 1 = 39°$

$m\angle 3 = 90 - 39 = 51°$

29. Which description does NOT guarantee that a trapezoid is isosceles?

A

a. congruent bases → could be a right trap.
b. congruent diagonals
c. both pairs of base angles congruent
d. congruent legs

30. $\angle J$ and $\angle M$ are base angles of isosceles trapezoid $JKLM$. If $m\angle J = 20x + 9$, and $m\angle M = 14x + 15$, find $m\angle K$.

a. 151   b. 1   c. 29   d. 75.5

A

$20x + 9 = 14x + 15$

$180 - 29$
$= 151°$

$6x = 6$
$x = 1$

$m\angle J = 29$

K   L
29°   29°
J   M
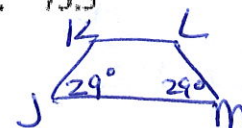
31. $m\angle R = 130$ and $m\angle S = 80$. Find $m\angle T$. The diagram is not to scale.

$360° - 130 - 2(80) = 70°$

R
130°
U 80°   80° S

T
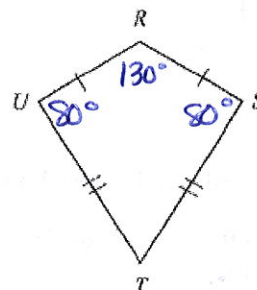
32. One side of a kite is 8 cm less than four times the length of another side. The perimeter of the kite is 78 cm. Find the lengths of the sides of the kite.

a. 9.4 cm and 29.6 cm   c. 23.5 cm
b. 23.5 cm and 86 cm   d. 9.4 cm

$2(4x-8) + 2x = 78$
$8x - 16 + 2x = 78$
$10x = 94$ $x = 9.4$

4x - 8

$4x - 8 = 29.6$ cm

x $x = 9.4$ cm
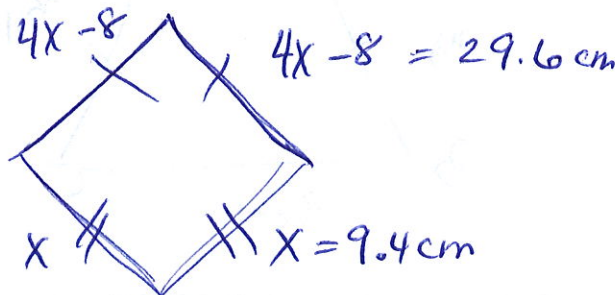
33. For the parallelogram, find coordinates for P without using any new variables.

y
(a, b)   P $(c+a, b)$

a

O   c   x

c + a

34. In the coordinate plane, three vertices of rectangle $HIJK$ are $H(0, 0)$, $I(0, d)$, and $K(e, 0)$. What are the coordinates of point J?

a. $(2e, 2d)$ b. (d, e) c. (e, d) d. $\left(\dfrac{d}{2}, \dfrac{e}{2}\right)$

[handwritten: C]

[handwritten diagram of rectangle labeled I, J (e,d), H, K]

35. Which diagram shows the most useful positioning of a square in the first quadrant of a coordinate plane?

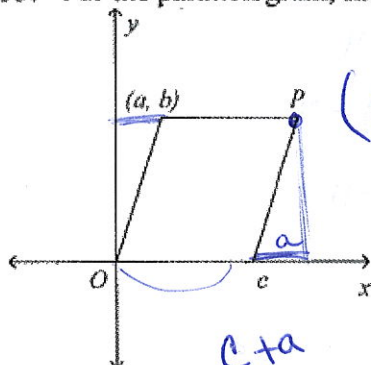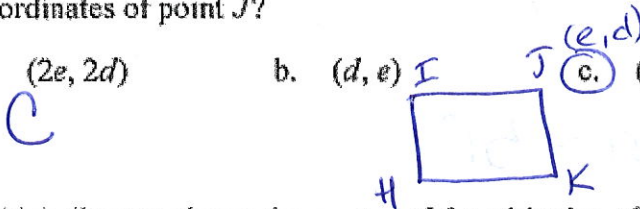a. *[square with vertices $(1, a)$, (a, a), $(1, 0)$, $(a, 0)$]*

b. *[square with vertices $(1, a)$, (a, a), $(1, 1)$, $(a, 1)$]*

c. *[handwritten: C]* *[square with vertices $(0, a)$, (a, a), $(0, 0)$, $(a, 0)$]*

d. *[square (diamond) with vertices $(a, 2a)$, $(2a, a)$, $(0, a)$, $(a, 0)$]*

[handwritten: C]

36. Which diagram shows the most useful positioning and accurate labeling of a kite in the coordinate plane?

a. *[circled]* *[kite with vertices $(0, c)$, $(-a, 0)$, $(b, 0)$, $(0, -d)$]* *[handwritten: ok]*

b. *[figure with (b, c), $(0, a)$, $(0, 0)$, $(a, 0)$]*

c. *[figure with $(2a, 2a)$, $(0, a)$, $(0, 0)$, $(a, 0)$]*

d. *[circled]* *[kite with vertices $(0, c)$, $(-a, 0)$, $(b, 0)$, $(0, -c)$]* *[handwritten: Better]*

[handwritten: A or D] *[handwritten: if $c = d$]*

37. What type of quadrilateral has exactly one pair of parallel sides? *[handwritten: Trapezoid]*

38. Isosceles trapezoid $ABCD$ has legs $\overline{AB}$ and $\overline{CD}$, and base $\overline{BC}$. If $AB = 4y - 3$, $BC = 3y - 4$, and $CD = 5y - 10$, find the value of y.

[handwritten diagram of trapezoid A, D, B, C with $4y-3$, $5y-10$, $3y-4$ labeled]
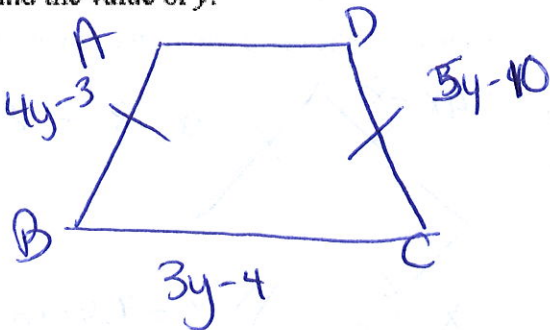
[handwritten:
$$4y - 3 = 5y - 10$$
$$7 = y$$
]

39. For parallelogram $PQRS$, find the values of x and y. Then find PT, TR, ST, and TQ. The diagram is not to scale.

[diagram of parallelogram P, Q, R, S with diagonals intersecting at T, labeled $2x-1$, $x+4$, $y-1$, $3y-11$]
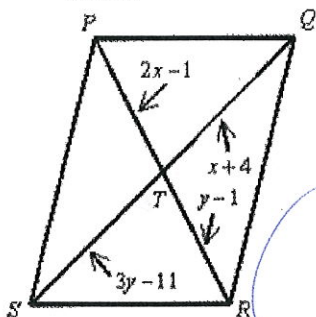
[handwritten:
$$2x - 1 = y - 1$$
$$2x = y \quad (y = 6)$$
$$PT = 5$$
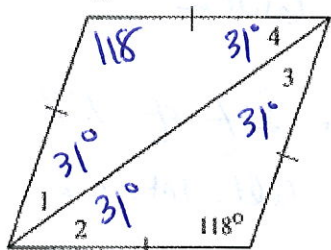$$TR = 5$$
$$ST = 7$$
$$TQ = 7$$

$$x + 4 = 3y - 11$$
$$x + 4 = 3(2x) - 11$$
$$x + 4 = 6x - 11$$
$$15 = 5x$$
$$3 = x$$
]

40. Give the name that best describes the parallelogram and find the measures of the numbered angles. The diagram is not to scale.
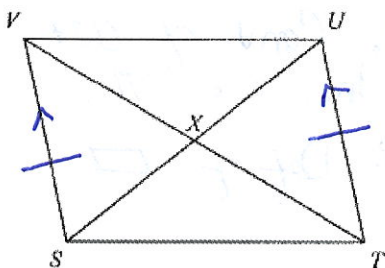

Rhombus

$180 - 118 = 62$

$\dfrac{62}{2} = 31$

$m\angle 1 = m\angle 2 = m\angle 3$
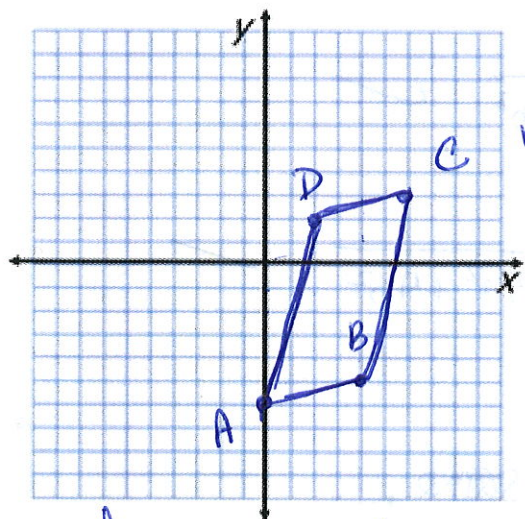$= m\angle 4$
$= 31°$

Complete the following proofs:

41. **Given:** $\overline{SV} \cong \overline{TU}$ and $\overline{SV} \parallel \overline{TU}$
    Prove: $VX = XT$

Statements	Reasons
1. $\overline{SV} \cong \overline{TU}$, $\overline{SV} \parallel \overline{TU}$	1. Given
2. VUTS is a ▱	2. If one pr. of opp. sides is ≅ & ∥, the figure is a ▱.
3. $\overline{VX} \cong \overline{XT}$	3. Diagonals of a ▱ bisect each other.

42. Show that the quadrilateral with vertices A(0, - 6), B(4, - 5), C(6, 3), and D(2, 2) is a parallelogram.

Using Slopes:

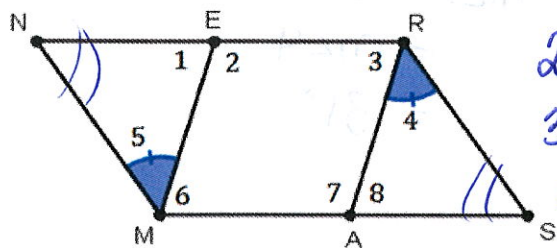$m\,\overline{AB} = \dfrac{-1}{-4} = \dfrac{1}{4}$

$m\,\overline{AD} = \dfrac{8}{2} = 4$

$m\,\overline{DC} = \dfrac{1}{4}$ $m\,\overline{BC} = \dfrac{8}{2} = 4$

Since the slopes of opp. sides are ≅, the opp. sides are ∥. Therefore ABCD is a parallelogram.

43. **Given :** $NRSM$ is a parallelogram
$\angle 4 \cong \angle 5$

Prove : $ERAM$ is a parallelogram

| Statements	Reasons
1. $NRSM$ is a $\square$	1. Given
$\angle 4 \cong \angle 5$	
2. $\overline{NR} \parallel \overline{MS}$	2. Def of $\square$
3. $\angle 3 \cong \angle 8$	3. alt. int. $\angle$'s
4. $\angle N \cong \angle S$	4. opp. $\angle$'s of a $\square$ are $\cong$.
5. $\angle 1 \cong \angle 8$	5. 3rd $\angle$ Th. for Triangles.
6. $\angle 1 \cong \angle 3$	6. Trans. Prop.
7. $\overline{EM} \parallel \overline{RA}$	7. Conv. of alt. Int. $\angle$'s Th.
8. $ERAM$ is a $\square$	8. Def of $\square$

※ This is only one way to complete this proof. There are many.

---

44. Complete the coordinates for rectangle *DHCP*. Then use coordinate geometry to prove the following statement: The diagonals of a rectangle are congruent (Theorem 6-11).

Given: rectangle *DHCP*

Prove: $\overline{DC} \cong \overline{HP}$

$(0, 2b)$

$H\,(2a, 2b)$

$P\,(0, 0)$

$(2a, 0)$
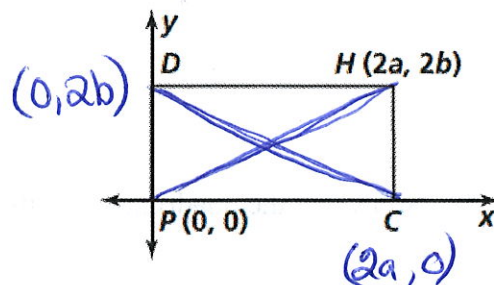
$DC = \sqrt{(2a-0)^2 + (0-2b)^2}$

$\quad = \sqrt{(2a)^2 + (-2b)^2} = \sqrt{4a^2 + 4b^2}$ ✓

$HP = \sqrt{(2a-0)^2 + (2b-0)^2} = \sqrt{4a^2 + 4b^2}$ ✓

$\sqrt{(2a)^2 + (2b)^2}$

Since the distances are the same,
$\overline{DC} \cong \overline{HP}$