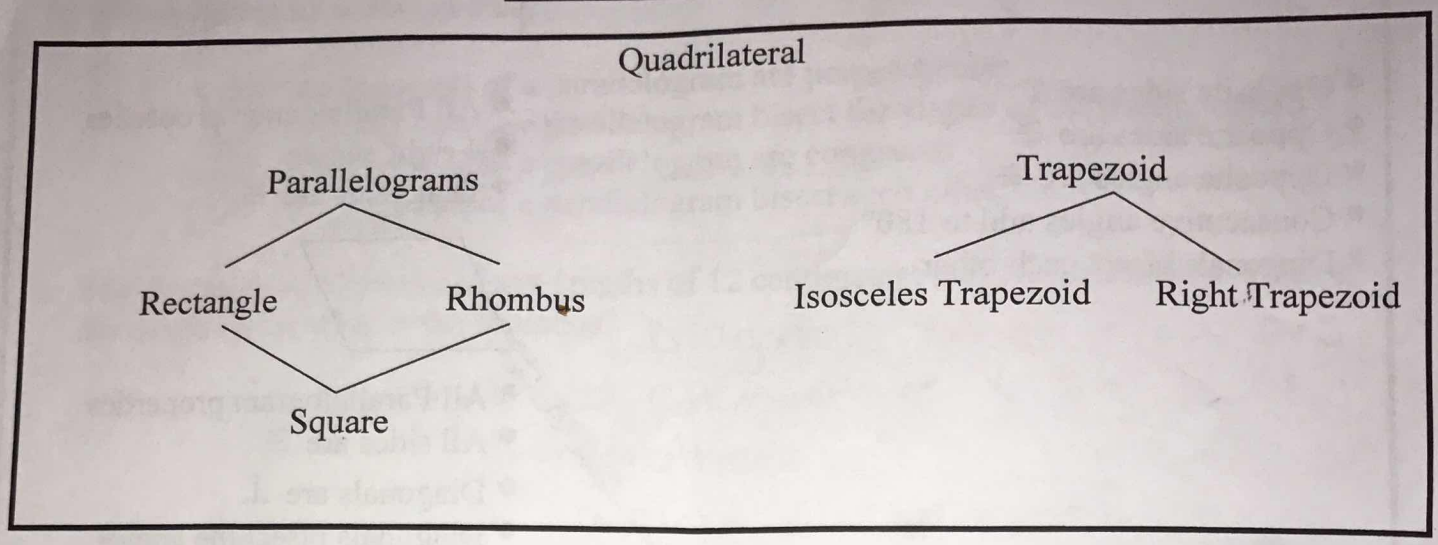
Name_____ Date_____

Regents Review #4 Common Core Honors Geometry

QUADRILATERALS



1. Which statement is *not* true?

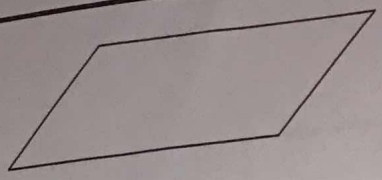
(1) All squares are rectangles.
(2) All rectangles are parallelograms.
(3) All parallelograms are rectangles.
(4) All parallelograms are quadrilaterals.

2. Which statement is *always true*?

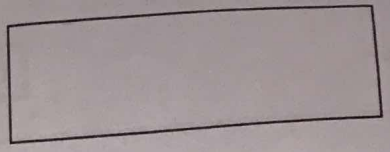
(1) A square is a rectangle.
(2) A parallelogram is a square.
(3) A rectangle is a rhombus.
(4) A trapezoid is a parallelogram.

3. Which statement is *always true*?

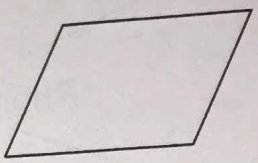
(1) All rhombus' are squares.
(2) All rhombus' are rectangles.
(3) All rhombus' are trapezoids.
(4) All rhombus' are parallelograms.



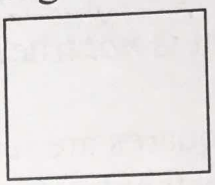
- Opposite sides are //
- Opposite sides are ≅
- Opposite angles are ≅
- Consecutive angles add to 180°
- Diagonals bisect each other



- All Parallelogram properties
- 4 right angles
- Diagonals are ≅



- All Parallelogram properties
- All sides are ≅
- Diagonals are ⊥
- Diagonals bisect the angles

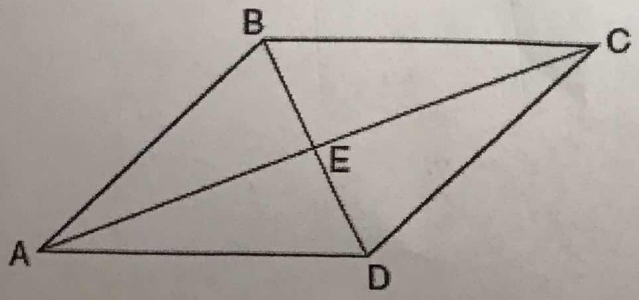


- All parallelogram properties
- All rectangle properties
- All rhombus properties

4. Which property is *not* true for *all* parallelograms?

(1) Opposite angles are congruent.
(3) Consecutive angles are supplementary.
(2) Opposite sides are congruent.
(4) Diagonals are congruent.

5. In the accompanying diagram of parallelogram $ABCD$, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E, $BE = 3x - 40$, and $ED = x - 10$. What is the value of x? Diagonals of a parallelogram bisect each other!



$BE \cong ED$

$3x - 40 = x - 10$

$-x \quad +40 \quad -x \quad +40$

$\frac{2x}{2} = \frac{30}{2}$

$x = 15$

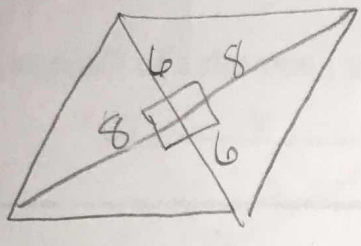
In which figure are the diagonals perpendicular?

(1) parallelogram (2) rhombus (3) rectangle (4) isosceles trapezoid

7. Which statement is *always true*?

(1) The diagonals of a parallelogram are perpendicular
(2) The diagonals of a parallelogram bisect the angles of the parallelogram
(3) The diagonals of a parallelogram are congruent
(4) The diagonals of a parallelogram bisect each other. ✓

8. The diagonals of a rhombus have lengths of 12 centimeters and 16 centimeters. What is the length of one side of the rhombus? Diagonals of a rhombus bisect each other & are ⊥ to each other.



a right △ is created

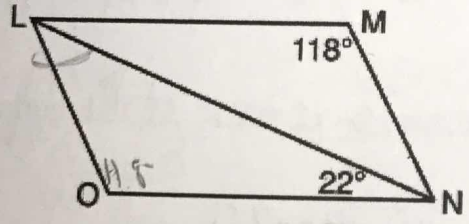
$6^2+8^2=x^2$

$100=x^2$

$x=10$

1 side is 10

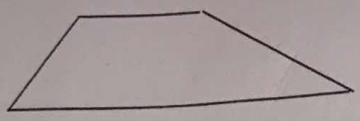
9. The diagram below shows parallelogram $LMNO$ with diagonal $\overline{AC}$, $m\angle M = 118°$, and $m\angle LNO = 22°$. Explain why $m\angle NLO$ is 40 degrees.



In a parallelogram opposite angles are ≅. So since $\angle M = 118$, $\angle O = 118$ as well. Also, there are 180° in the interior of a △ so since $\angle O = 118$ and $\angle LNO = 22°$, $\angle NLO$ must equal 40° since

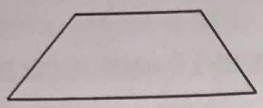
$118+22+40=180°$.

Trapezoid



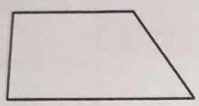
- ONLY one pair of opposite sides are parallel (referred to as the BASES)

Isosceles Trapezoid



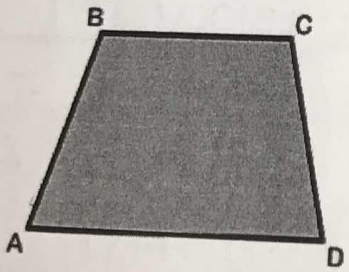
- ONLY one pair of opposite sides are parallel
- The non-parallel sides (LEGS) are congruent
- The diagonals are congruent
- The base angles are congruent

Right Trapezoid



- ONLY one pair of opposite side are parallel
- One of the legs is perpendicular to the bases

10. In isosceles trapezoid $ABCD$, $\overline{BC} \parallel \overline{AD}$. If $m\angle A = 4x + 20$ and $m\angle D = 2x + 30$, find the measures of all four angles.



In an isosceles trapezoid, base angles are $\cong$. $\angle A \cong \angle D$

$4x + 20 = 2x + 30$

$-2x - 20 \quad -2x - 20$

$\frac{2x}{2} = \frac{10}{2}$

$x = 5$

$m\angle A = 4x + 20$

$= 4(5) + 20$

$\angle A = 40$

$\angle A$ & $\angle B$ are supplementary, so $180 - 40$

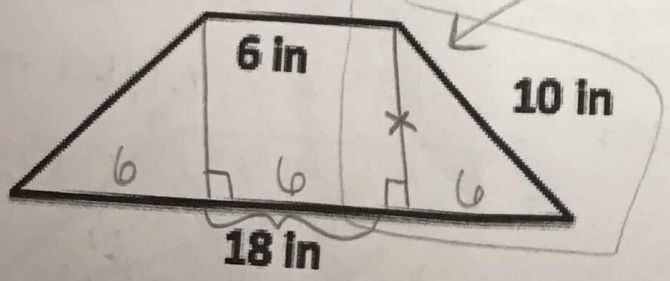
$140 = \angle B$

$140 = \angle C$

$40 = \angle A$

$40 = \angle D$

Find the height of the isosceles trapezoid below.



Form a right $\triangle$ by dropping 2 altitudes

$6^2 + x^2 = 10^2$

$36 + x^2 = 100$

$-36 \quad -36$

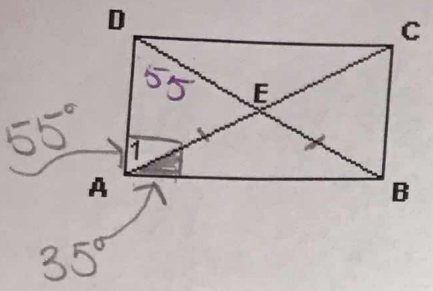
$x^2 = 64$

$x = 8$

1. Which statement is *always* true?

(1) Rhombuses are squares.
(2) Parallelograms are rectangles.
(3) Rectangles are squares.
(4) Squares are rectangles. ✓

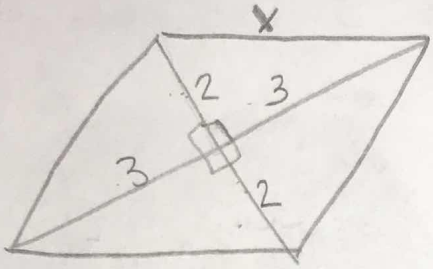
2. In rectangle $ABCD$, $\overline{AC}$ and $\overline{BD}$ are diagonals. If $m\angle 1 = 55$, find $m\angle ABD$.



Since the diagonals of a rectangle are ≅ and bisect eachother, $\triangle AEB$ is isosceles bc $AE \cong EB$. ∴, $\angle ABD \cong \angle EAB$.

$\angle ABD = 35°$

3. The diagonals of a rhombus are 6 and 4. What is the measure of each side?



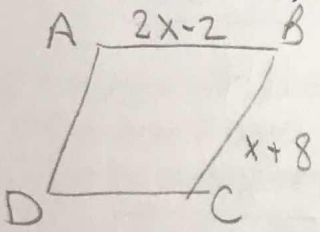
$2^2 + 3^2 = x^2$

$4 + 9 = x^2$

$13 = x^2$

$x = \sqrt{13}$

4. In rhombus $ABCD$, $AB = 2x - 2$ and $BC = x + 8$. Find the perimeter of the rhombus.



In a rhombus, all 4 sides are ≅.

$2x - 2 = x + 8$

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

$x = 10$

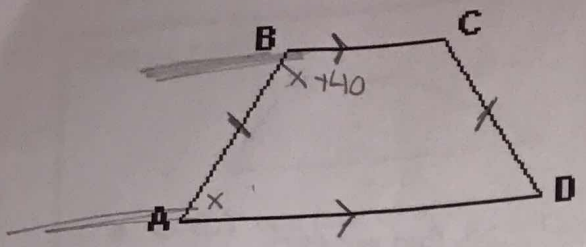
$AB = 2x - 2$

$= 2(10) - 2$

$= 18$

$18 \cdot 4 = 72$ perimeter

5. In the diagram of isosceles trapezoid ... than the measure of $\angle A$. Find $m\angle A$.



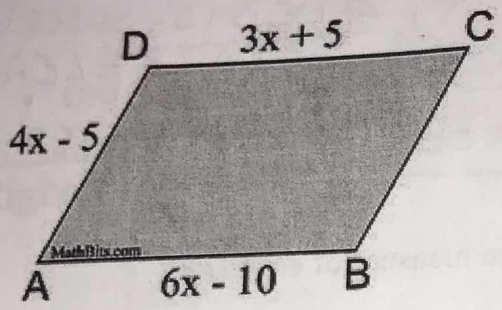
$\angle B = 40 + x$ $\quad \angle A + \angle B = 180$

$\angle A = x$ $\quad 40 + x + x = 180$

$\frac{2x}{2} = \frac{140}{2}$ $\quad x = 70$

$\angle A = 70°$

6. Find AD in the parallelogram given.



In a parallelogram, opposite sides are $\cong$

$3x + 5 = 6x - 10$

$-3x + 10 \quad -3x + 10$

$\frac{15}{3} = \frac{3x}{3}$ $\quad x = 5$

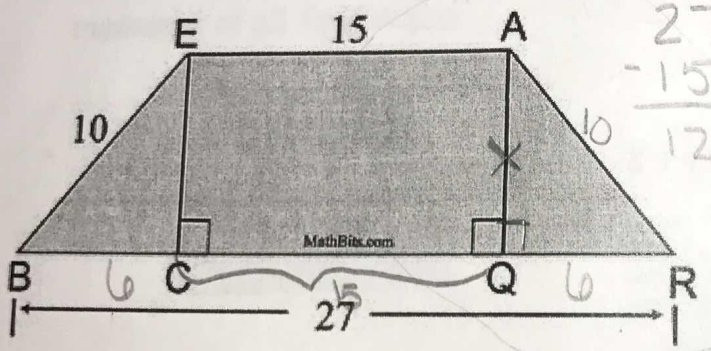
AD

$4x - 5$

$4(5) - 5$

$AD = 15$

7. Find AQ in the isosceles trapezoid given.



$27 - 15 = 12$

$12 \div 2 = 6$

$x^2 + 6^2 = 10^2$

$x^2 + 36 = 100$

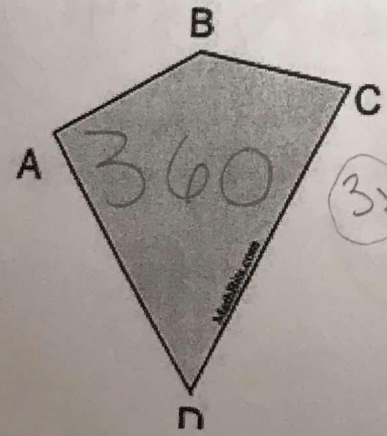
$-36 \quad -36$

$x^2 = 64$

$x = 8$

$AQ = 8$

8. In the quadrilateral below, $m\angle A = 3x + 9$, $m\angle B = 5x + 20$, $m\angle C = 3x$, and $m\angle D = 2x + 6$. Find $m\angle D$.



We do not know what kind of quadrilateral but we Do know that the interior angles must equal 360

$3x + 9 + 5x + 20 + 3x + 2x + 6 = 360$

$13x + 35 = 360$

$-35 \quad -35$

$13x = 325$

$\frac{13x}{13} = \frac{325}{13}$

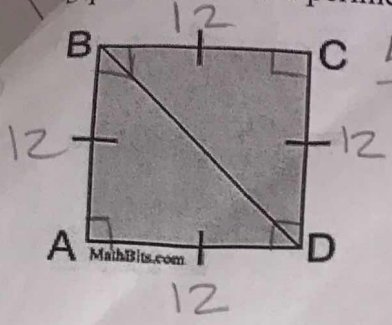
$x = 25$

$\angle D = 2x + 6$

$2(25) + 6$

$\angle D = 56°$

Square $ABCD$ has perimeter 48 units. Find BD in simplest radical form.



$\frac{48}{4} = 12$

45-45-90 △

$BD = 12\sqrt{2}$

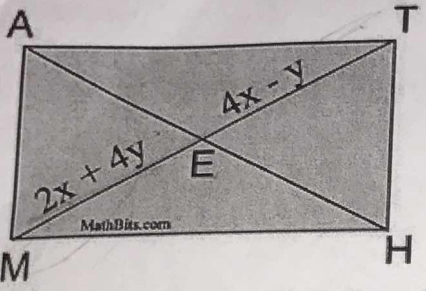
$12^2 + 12^2 = x^2$

$144 + 144 = x^2$

$288 = x^2$

$\rightarrow x = 12\sqrt{2}$

10. In rectangle MATH, each diagonal measures 36 inches. Find x and y.



$x = 5$

$y = 2$

$2x + 4y = 18$

$4(4x - y = 18)$ } eliminate a variable by multiplying 2nd row by 4

$16x - 4y = 72$

$2x + 4y = 18$

$\frac{18x}{18} = \frac{90}{18}$ | $x = 5$

$y = 2$

$2x + 4y = 18$

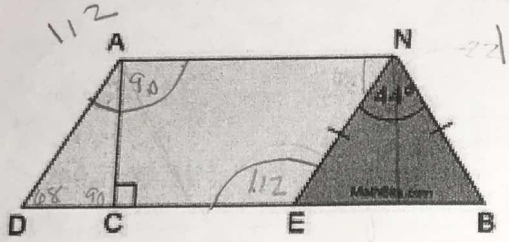
$2(5) + 4y = 18$

$10 + 4y = 18$

$4y = 8$

$x = \frac{5}{2}$

11. Given parallelogram DANE and isosceles triangle BEN. $m\angle ENB = 44°$ and $\overline{AC}$ is an altitude. Find $m\angle DAC$.



a triangle has 180°

$180 - 44 = \frac{136}{2} = 68$

$y = 2$

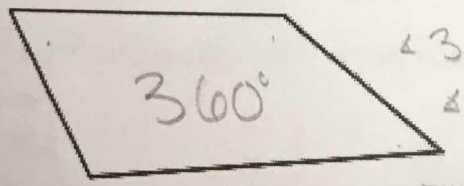
$\angle DAC = 22°$

SO, $\angle NEB = 68°$

SO $\angle NEC = 112°$

$\angle DAN = 112$ also since opposite angles of a parallelogram are $\cong$ $\frac{112}{90} = 22°$

12. The measure of one angle of a quadrilateral is 3more than the smallest; the third angle is 5 less than 8 times the smallest; and the fourth angle is 2 more than 8 times the smallest. Find the measures of all four angles of the quadrilateral.



$\angle 1 = x$

$\angle 2 = 3 + x$

$\angle 3 = 8x - 5$

$\angle 4 = 8x + 2$

$x + 3 + x + 8x - 5 + 8x + 2 = 360$

$\frac{18x}{18} = \frac{360}{18}$

$x = 20$

sum should $= 360$ → ✓ Check

$\angle 1 = 20°$

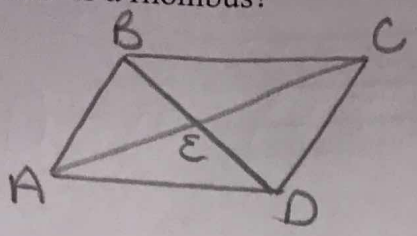
$\angle 2 = 23°$

$\angle 3 = 155°$

$\angle 4 = 162°$

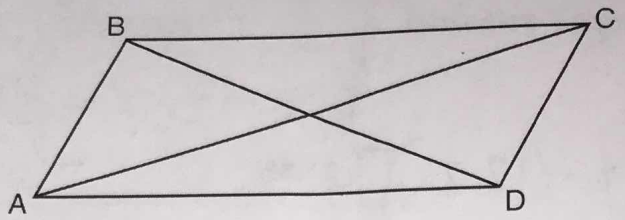
13. In parallelogram $ABCD$, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E. Which statement does *not* prove parallelogram $ABCD$ is a rhombus?

1) $\overline{AC} \cong \overline{DB}$
2) $\overline{AB} \cong \overline{BC}$
3) $\overline{AC} \perp \overline{DB}$
4) $\overline{AC}$ bisects $\angle DCB$



Diagonals of a rhombus are not ≅.

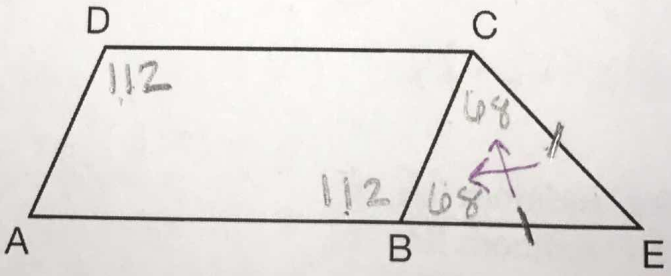
14. Quadrilateral $ABCD$ with diagonals $\overline{AC}$ and $\overline{BD}$ is shown in the diagram below.



Which information is *not* enough to prove $ABCD$ is a parallelogram?

1) $\overline{AB} \cong \overline{CD}$ and $\overline{AB} \parallel \overline{DC}$ ✓
2) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \cong \overline{DA}$ ✓
3) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \parallel \overline{AD}$
4) $\overline{AB} \parallel \overline{DC}$ and $\overline{BC} \parallel \overline{AD}$

15. In the diagram below, $ABCD$ is a parallelogram, $\overline{AB}$ is extended through B to E, and $\overline{CE}$ is drawn.



180
−636

If $\overline{CE} \cong \overline{BE}$ and $m\angle D = 112°$, what is $m\angle E$?

1) 44°
2) 56°
3) 68°
4) 112°