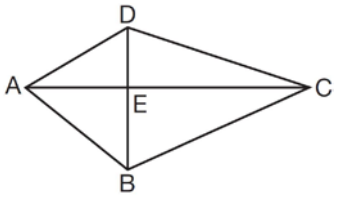
G.CO.C.11: Special Quadrilaterals 2

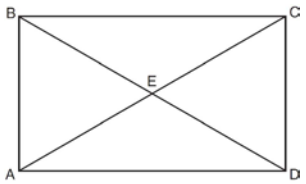
1 In the diagram below of quadrilateral $ABCD$, diagonals $\overline{AEC}$ and $\overline{BED}$ are perpendicular at E.



Which statement is always true based on the given information?

1) $\overline{DE} \cong \overline{EB}$
2) $\overline{AD} \cong \overline{AB}$
3) $\angle DAC \cong \angle BAC$
4) $\angle AED \cong \angle CED$

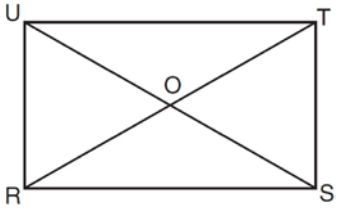
2 As shown in the diagram of rectangle $ABCD$ below, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E.



If $AE = x + 2$ and $BD = 4x - 16$, then the length of $\overline{AC}$ is

1) 6
2) 10
3) 12
4) 24

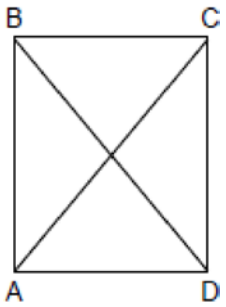
3 In the diagram below of rectangle $RSTU$, diagonals $\overline{RT}$ and $\overline{SU}$ intersect at O.



If $RT = 6x + 4$ and $SO = 7x - 6$, what is the length of $\overline{US}$?

1) 8
2) 2
3) 16
4) 32

4 In the accompanying diagram of rectangle $ABCD$, $m\angle BAC = 3x + 4$ and $m\angle ACD = x + 28$.

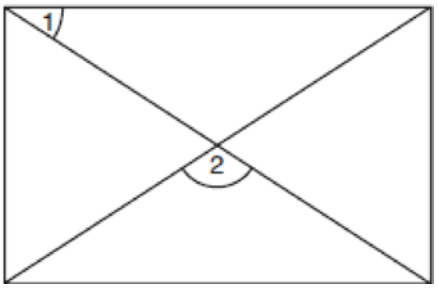


What is $m\angle CAD$?

1) 12
2) 37
3) 40
4) 50

5 A builder is building a rectangular deck with dimensions of 16 feet by 30 feet. To ensure that the sides form 90° angles, what should each diagonal measure?
1) 16 ft
2) 30 ft
3) 34 ft
4) 46 ft

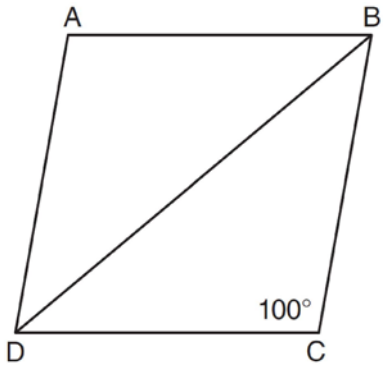
6 As shown in the accompanying diagram, a rectangular gate has two diagonal supports. If $m\angle 1 = 42$, what is $m\angle 2$?



7 In rectangle $ABCD$, $AC = 3x + 15$ and $BD = 4x - 5$. Find the length of $\overline{AC}$.

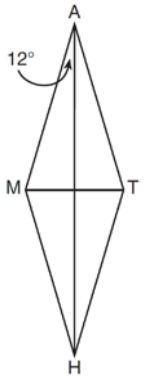
8 Al says, "If $ABCD$ is a parallelogram, then $ABCD$ is a rectangle." Sketch a quadrilateral $ABCD$ that shows that Al's statement is *not* always true. Your sketch must show the length of each side and the measure of each angle for the quadrilateral you draw.

9 In the diagram below of rhombus $ABCD$, $m\angle C = 100$.



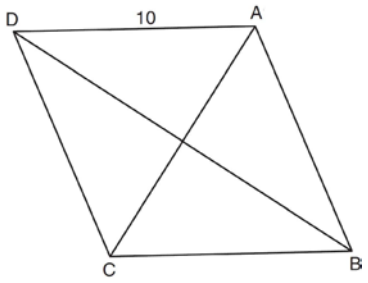
What is $m\angle DBC$?
1) 40
2) 45
3) 50
4) 80

10 In the diagram below, $MATH$ is a rhombus with diagonals $\overline{AH}$ and $\overline{MT}$.



If $m\angle HAM = 12$, what is $m\angle AMT$?
1) 12
2) 78
3) 84
4) 156

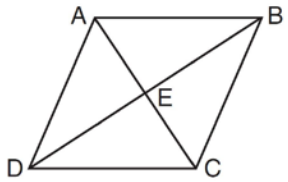
11 In rhombus $ABCD$, with diagonals $\overline{AC}$ and $\overline{DB}$, $AD = 10$.



If the length of diagonal $\overline{AC}$ is 12, what is the length of $\overline{DB}$?

1) 8
2) 16
3) $\sqrt{44}$
4) $\sqrt{136}$

12 In the diagram below of rhombus $ABCD$, the diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E.



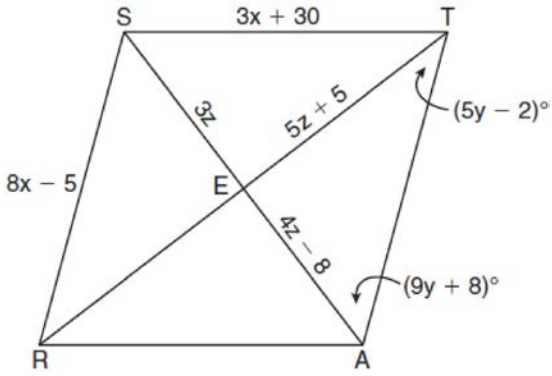
If $AC = 18$ and $BD = 24$, what is the length of one side of rhombus $ABCD$?

1) 15
2) 18
3) 24
4) 30

13 In rhombus $ABCD$, the diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E. If $AE = 5$ and $BE = 12$, what is the length of $\overline{AB}$?

1) 7
2) 10
3) 13
4) 17

14 In the diagram below, quadrilateral $STAR$ is a rhombus with diagonals $\overline{SA}$ and $\overline{TR}$ intersecting at E. $ST = 3x + 30$, $SR = 8x - 5$, $SE = 3z$, $TE = 5z + 5$, $AE = 4z - 8$, $m\angle RTA = 5y - 2$, and $m\angle TAS = 9y + 8$. Find SR, RT, and $m\angle TAS$.



15 In rhombus $ABCD$, the measure, in inches, of $\overline{AB}$ is $3x + 2$ and $\overline{BC}$ is $x + 12$. Find the number of inches in the length of $\overline{DC}$.

16 Which statement about quadrilaterals is true?

1) All quadrilaterals have four right angles.
2) All quadrilaterals have equal sides.
3) All quadrilaterals have four sides.
4) All quadrilaterals are parallelograms.

17 Which statement is *false*?

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

18 A quadrilateral whose diagonals bisect each other and are perpendicular is a

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

19 Which quadrilateral has diagonals that always bisect its angles and also bisect each other?
1) rhombus
2) rectangle
3) parallelogram
4) isosceles trapezoid

20 The diagonals of a quadrilateral are congruent but do not bisect each other. This quadrilateral is
1) an isosceles trapezoid
2) a parallelogram
3) a rectangle
4) a rhombus

21 In quadrilateral *ABCD*, the diagonals bisect its angles. If the diagonals are *not* congruent, quadrilateral *ABCD* must be a
1) square
2) rectangle
3) rhombus
4) trapezoid

22 Which quadrilateral has diagonals that are always perpendicular bisectors of each other?
1) square
2) rectangle
3) trapezoid
4) parallelogram

23 Which quadrilateral must have diagonals that are congruent and perpendicular?
1) rhombus
2) square
3) trapezoid
4) parallelogram

24 In a certain quadrilateral, two opposite sides are parallel, and the other two opposite sides are not congruent. This quadrilateral could be a
1) rhombus
2) parallelogram
3) square
4) trapezoid

25 Given three distinct quadrilaterals, a square, a rectangle, and a rhombus, which quadrilaterals must have perpendicular diagonals?
1) the rhombus, only
2) the rectangle and the square
3) the rhombus and the square
4) the rectangle, the rhombus, and the square

26 In quadrilateral *ABCD*, each diagonal bisects opposite angles. If $m\angle DAB = 70$, then *ABCD* must be a
1) rectangle
2) trapezoid
3) rhombus
4) square

27 A set of five quadrilaterals consists of a square, a rhombus, a rectangle, an isosceles trapezoid, and a parallelogram. Lu selects one of these figures at random. What is the probability that both pairs of the figure's opposite sides are parallel?
1) 1
2) $\frac{4}{5}$
3) $\frac{3}{4}$
4) $\frac{2}{5}$

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Answer Section

1 ANS: 4 REF: 081417ge

2 ANS: 4

$2x - 8 = x + 2$. $AE = 10 + 2 = 12$. $AC = 2(AE) = 2(12) = 24$

$x = 10$

REF: 011327ge

3 ANS: 3

$6x + 4 = 2(7x - 6)$ $US = 6(2) + 4 = 16$

$6x + 4 = 14x - 12$

$16 = 8x$

$x = 2$

REF: 011603ge

4 ANS: 4

Because $ABCD$ is a rectangle, $\overline{AB}$ and $\overline{CD}$ are parallel and $\overline{AC}$ is a transversal. $\angle BAC$ and $\angle ACD$ are equal alternate interior angles. $3x + 4 = x + 28$, $x = 12$. m$\angle BAC$ = 3(12) + 4 = 40. Since $\angle BAC$ and $\angle$CAD are complementary, m$\angle$CAD = 50.

REF: 089909a

5 ANS: 3

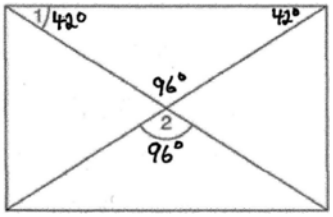
$16^2 + 30^2 = c^2$

$1156 = c^2$. 16, 30, 34 is a multiple of the 8, 15, 17 triangle.

$34 = c$

REF: 010615a

6 ANS:



96.

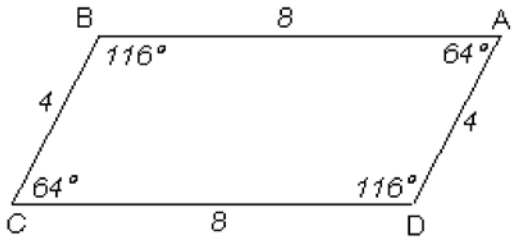
REF: 010835a

7 ANS:

75. The diagonals of a parallelogram are congruent. $3x + 15 = 4x - 5$, $x = 20$. $AC = 3(20) + 15 = 75$.

REF: 010533a

8 ANS:



REF: 010025a

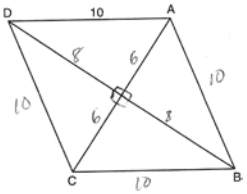
9 ANS: 1 REF: 011112ge

10 ANS: 2

The diagonals of a rhombus are perpendicular. $180 - (90 + 12) = 78$

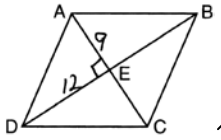
REF: 011204ge

11 ANS: 2



REF: 061414ge

12 ANS: 1



$\sqrt{9^2 + 12^2} = 15$

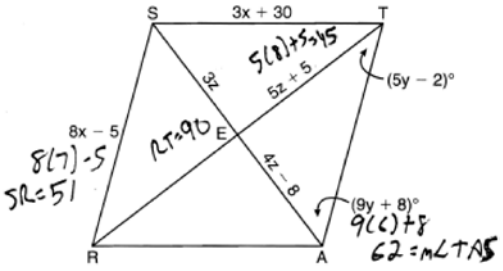
REF: 011505ge

13 ANS: 3

$\sqrt{5^2 + 12^2} = 13$

REF: 061116ge

14 ANS:



$8x - 5 = 3x + 30$. $4z - 8 = 3z$. $9y + 8 + 5y - 2 = 90$.

$5x = 35$ $z = 8$ $14y + 6 = 90$

$x = 7$ $14y = 84$

$y = 6$

REF: 061038ge

15 ANS:

17. A rhombus has four congruent sides. $\begin{array}{l} 3x + 2 = x + 12 \\ x = 5 \end{array}$. $(5) + 12 = 17$.

REF: 080735a

16 ANS: 3 REF: 010404a

17 ANS: 4

Not all rectangles are squares.

REF: 010919a

18 ANS: 1 REF: 080918ge

19 ANS: 1 REF: 061125ge

20 ANS: 1 REF: 081121ge

21 ANS: 3 REF: 081419ge

22 ANS: 1 REF: 081517ge

23 ANS: 2 REF: 060526a

24 ANS: 4 REF: 080517a

25 ANS: 3 REF: 081128ge

26 ANS: 3

Diagonals of rectangles and trapezoids do not bisect opposite angles. m$\angle DAB = 90$ if $ABCD$ is a square.

REF: 061511ge

27 ANS: 2

In an isosceles trapezoid, only one pair of opposite sides is parallel.

REF: 010721a