6.1 Interior Angles in Convex Polygons

Answers

1.

# of sides	Sum of the Interior Angles	Each angle in a *regular n*-gon
3	180°	60°
4	360°	90°
5	540°	108°
6	720°	120°
7	900°	128.57°
8	1080°	135°
9	1260°	140°
10	1440°	144°
11	1620°	147.27°
12	1800°	150°

2. 2340°
3. 3780°
4. 26
5. 20
6. 157.5°
7. 165°
8. 15
9. 4
10. 163°
11. 168°
12. 120°
13. 60°
14. $x = 90°$, $y = 20°$
15. 35°
16. 115°
17. 105°
18. $x = 51°$, $y = 108°$
19. 117.5°

6.2 Exterior Angles in Convex Polygons

Answers

1. 36°
2. 12°
3. 360°
4. $x = 72.5°$, $y = 107.5°$
5. $x = 90°$, $y = 64°$
6. 36°
7. 45°
8. 40°
9. 120°
10. 72°
11. 7.2°
12. 51.43°
13. 10.59°
14. $180° - \frac{(n-2)180°}{n} \rightarrow \frac{180°n}{n} + \frac{-180°n + 360°}{n} \rightarrow \frac{360°}{n}$
15. $a = 120°$, $b = 60°$, $c = 48°$, $d = 60°$, $e = 48°$, $f = 84°$, $g = 120°$, $h = 108°$, $j = 96°$

6.3 Parallelograms

Answers

1. $m\angle Q = 143°$, $m\angle P = m\angle D = 37°$
2. All the angles are 90°.
3. $m\angle H = x°$, $m\angle E = m\angle G = (180 - x)°$.
4. c = 6
5. $d = 10$, $e = 14$
6. $f = 5$, $g = 3$
7. $h = 25°$, $j = 11°$, $k = 8°$
8. $m = 25°$, $n = 19°$
9. $p = 8$, $q = 3$
10. $r = 1$, $s = 2$
11. $t = 3$, $u = 4$
12. 96°
13. 85°
14. 43°
15. 42°
16. 12
17. 2
18. 64º
19. 42º
20. (2, 1); use the midpoint formula for each diagonal.
21. slope of $\overline{EF}$ = slope of $\overline{GH} = \frac{1}{4}$; slope of $\overline{EH}$ = slope of $\overline{FG} = -\frac{5}{2}$; slopes of opposite sides are the same, therefore opposite sides are parallel.

22. $EF = HG = \sqrt{17}$; $FG = EH = \sqrt{29}$; lengths of opposite sides are equal.

23. A quadrilateral in the coordinate plane can be show to be a parallelogram by showing any one of the three properties of parallelograms shown in questions 20-22.

24.

Statement	***Reason***
1. *ABCD* is a parallelogram with diagonal $\overline{BD}$	Given
2. $\overline{AB} \parallel \overline{DC},\ \overline{AD} \parallel \overline{BC}$	Definition of a parallelogram
3. $\angle$ABD $\cong \angle$BDC, $\angle$ADB $\cong \angle$DBC	Alternate Interior Angles Theorem
4. $\overline{DB} \cong \overline{DB}$	Reflexive PoC
5. ΔABD $\cong \Delta$CDB	ASA
6. $\angle A \cong \angle C$	CPCTC

25.

Statement	***Reason***
1. *ABCD* is a parallelogram with diagonals $\overline{BD}$ and $\overline{AC}$	Given
2. $\overline{AB} \parallel \overline{DC},\ \overline{AD} \parallel \overline{BC}$	Definition of a parallelogram
3. $\angle$ABD $\cong \angle$BDC, $\angle$CAB $\cong \angle$ACD	Alternate Interior Angles Theorem
4. $\overline{AB} \cong \overline{DC}$	Opposite Sides Theorem
5. ΔDEC $\cong \Delta$BEA	ASA
6. $\overline{AE} \cong \overline{EC},\ \overline{DE} \cong \overline{EB}$	CPCTC

26. $w = 135^{\circ}$

27. $x = 16$

28. $y = 105^{\circ}$

29. $z = 60^{\circ}$

6.4 Quadrilaterals that are Parallelograms

Answers

1. Yes, Opposite Sides Converse
2. Yes, Opposite Angles Converse
3. Yes, Parallelogram Diagonals Converse
4. No; 7.1 ≠ 7.2
5. No; 75° ≠ 80°
6. Yes, Definition of a Parallelogram
7. No; 11≠ 10
8. Yes, Opposite Sides Converse
9. Yes, Opposite Angles Converse
10. No; this could be a trapezoid, we do not know anything about two of the angles.
11. No; this could be an isosceles trapezoid because consecutive angles are congruent.
12. $x = 5$
13. $x = 8°$, $y = 10°$
14. $x = 4$, $y = 3$
15. Yes
16. Yes
17. No
18.

Statement	***Reason***
1. $\overline{AE} \cong \overline{EC}, \overline{DE} \cong \overline{EB}$	Given
2. $\angle AED \cong \angle BEC$ $\angle DEC \cong \angle AEB$	Vertical Angles Theorem
3. $\Delta AED \cong \Delta CEB$ $\Delta AEB \cong \Delta CED$	SAS
4. $\overline{AB} \cong \overline{DC}$, $\overline{AD} \cong \overline{BC}$	CPCTC
5. *ABCD* is a parallelogram	Opposite Sides Converse

19.

Statement	***Reason***
1. $\angle ADB \cong \angle CBD$, $\overline{AD} \cong \overline{BC}$	Given
2. $\overline{AD} \| \| \overline{BC}$	Alternate Interior Angles Converse
3. *ABCD* is a parallelogram	Parallel Congruent Sides Theorem

20. 3

21. -2

22. $3\sqrt{5}$

23. $W(3,1)$, $X(4, 4)$, $Y(0, 6)$, $Z(-1, 3)$

24. Parallelogram

25. slope of $\overline{WX}$ = slope of $\overline{YZ}$ = 3, slope of $\overline{XY}$ = slope of $\overline{ZW}$ = $-\frac{1}{2}$

26. midpoint of $\overline{YW}$ is (1.5, 3.5), midpoint of $\overline{XZ}$ is (1.5, 3.5);

6.5 Parallelogram Classification

Answers

1. a) $RG = 13$
   b) $AE = 26$
   c) $AC = 24$
   d) $EC = 10$
   e) 90°

2. a) $MA = 12$
   b) $MI = 21.4$
   c) $DA = 11$
   d) 54°
   e) 90°

3. a) 90°
   b) 90°
   c) 45°
   d) 45°

4. Rectangle
5. Rhombus
6. None
7. Parallelogram
8. Square
9. Rectangle

10. None
11. Square
12. Parallelogram
13. $x = 10, w = 53°, y = 37°, z = 37°$
14. $x = 45°, y = 90°, z = 2\sqrt{2}$
15. $x = y = 13, w = z = 25°$
16. Sometimes, a rectangle is a rhombus when it is a square.
17. Always; a square is a more specific type of parallelogram.
18. Sometimes, a parallelogram is regular (sides and angles equal) when it is a square.
19. Always; a square is a more specific type of rectangle.

6.6 Trapezoids

Answers

1. No, if the parallel sides were congruent, then it would be a parallelogram. By the definition of a trapezoid, it can never be a parallelogram (exactly one pair of parallel sides).
2. 33
3. 28
4. 8
5. 11
6. 37
7. 5
8. $x = 4$
9. No
10. Yes
11. Yes
12. No

13.

Statement	***Reason***
1. TRAP is an isosceles trapezoid with $\overline{TR}\|\|\overline{AP}$	Given
2. $\overline{TP} \cong \overline{RA}$	Definition of isosceles trapezoid
3. $\overline{AP} \cong \overline{AP}$	Reflexive PoC
4. $\angle TPA \cong \angle RAP$	Base angles congruent in isosceles trapezoid
5. $\Delta TPA \cong \Delta RAP$	SAS
6. $\overline{TA} \cong \overline{RP}$	CPCTC

14. They are supplementary.
15. A quadrilateral where one pair of opposite sides (called bases) is parallel. The midsegment is the average of the two bases.

6.7 Kites

Answers

1. $x = 114°$, $y = 44°$
2. $x = y = 102.5°$
3. $x = 10$, $y = 6$
4. $x = 5$, $y = 12$
5. $x = 8$, $y = 17$
6. $x \approx 11.4$, $y = 41$
7. $x = 5$, $y \approx 8.54$
8. $x = 11$, $y = 17$
9. $y = 5°$
10. $y = 45°$
11. $x = 12$, $y = 8°$
12.

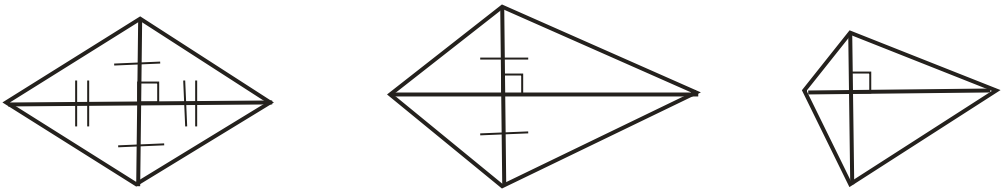
Statement	***Reason***
1. $\overline{KE} \cong \overline{TE}$ and $\overline{KI} \cong \overline{TI}$	Given
2. $\overline{EI} \cong \overline{EI}$	Reflexive PoC
3. $\Delta EKI \cong \Delta ETI$	SSS
4. $\angle$KES $\cong \angle$TES and $\angle$KIS $\cong \angle$TIS	CPCTC
5. $\overline{EI}$ is the angle bisector of $\angle$KET and $\angle$KIT	Definition of an angle bisector

13.

Statement	***Reason***
1. $\overline{KE} \cong \overline{TE}$ and $\overline{KI} \cong \overline{TI}$	Given
2. ΔKET and ΔKIT are isosceles triangles	Definition of isosceles triangles
3. $\overline{EI}$ is the angle bisector of $\angle$KET and $\angle$KIT	Theorem 6-22
4. $\overline{EI}$ is the perpendicular bisector of $\overline{KT}$	Isosceles Triangle Theorem
5. $\overline{KT} \perp \overline{EI}$	Definition of perpendicular lines.

14. Yes, unlike a kite and rhombus, there could exist a quadrilateral where the diagonals do not bisect each other.

Rhombus Kite Other



15. Construct two perpendicular lines to make the diagonals. One diagonal is bisected, so measure an equal length on either side of the point of intersection on one diagonal. Mark this as two vertices. The other two vertices are on the other diagonal. Place them anywhere on this diagonal and connect the four points to create the kite. ***Answers will vary***.

6.8 Quadrilateral Classification

Answers

1. Trapezoid
2. Rectangle or Square
3. Rhombus, Kite or Square
4. Square
5. Square
6. Square
7. Rhombus
8. Rectangle
9. Parallelogram
10. Rectangle
11. Square
12. Parallelogram
13. Rectangle
14. $CE = 8$
15. $SC = 14.42$, $RC = 16.97$