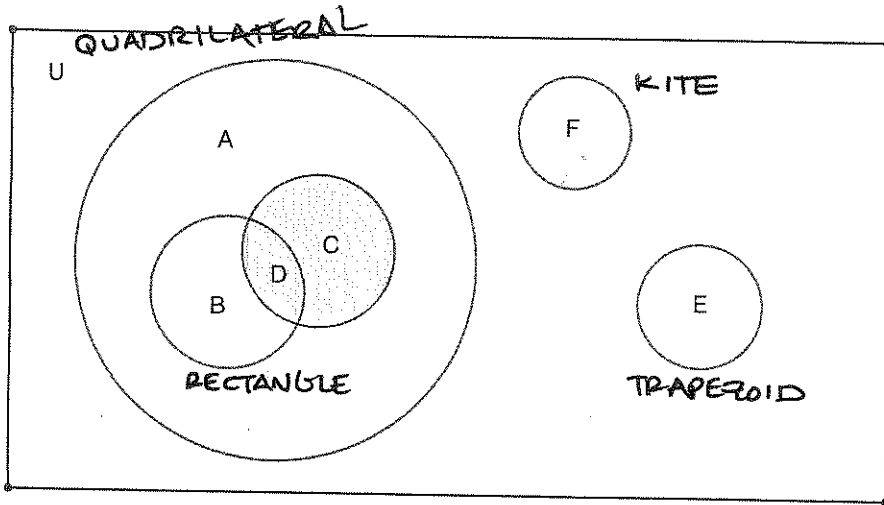


Polygons

Name the quadrilaterals which make the statement true

- In every PARALLELOGRAM, RECTANGLE, SQUARE, and RHOMBUS the diagonals bisect each other.
- In every RECTANGLE and SQUARE the diagonals are congruent. (ISOS. TRAP. TOO)
- In every RHOMBUS and SQUARE the diagonals bisect the angles.
- In every SQUARE and RHOMBUS the diagonals are perpendicular. (KITE TOO!)
- In every SQUARE the diagonals are congruent, perpendicular, and also bisect the angles.
- In every rectangle, the opposite sides are both PARALLEL (//) and CONGRUENT (\cong). The diagonals are \cong to each other but are not necessarily PERPENDICULAR (\perp) to each other. The diagonals BISECT each other. The angles are all RIGHT (90°) angles. A rectangle is also a PARALLELOGRAM.
- In a rhombus, all four sides are \cong and the opposite sides are //. The diagonals are \perp to each other and they BISECT each other, but they are not always \cong to each other. The diagonals BISECT the angles of a rhombus. A rhombus is also a PARALLELOGRAM.
- In a square, all four sides are \cong and the opposite sides are //. All four angles are RIGHT angles. The diagonals are both \cong and \perp to each other. They BISECT both each other and the angles of the square. A square is also a RHOMBUS, a RECTANGLE, and a PARALLELOGRAM.

Venn diagrams can be used to show the relationships among the various types of quadrilaterals. The figure labeled U represents the set of all quadrilaterals. The circle labeled B represents the set of all rectangles. The circle labeled F represents the set of all kites.

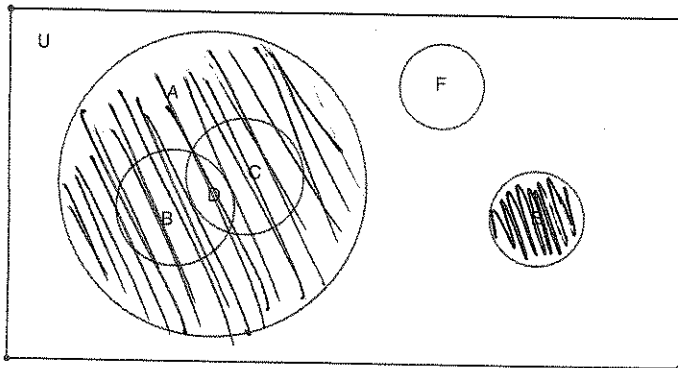


Match each quadrilateral with the letter for the set in the diagram.

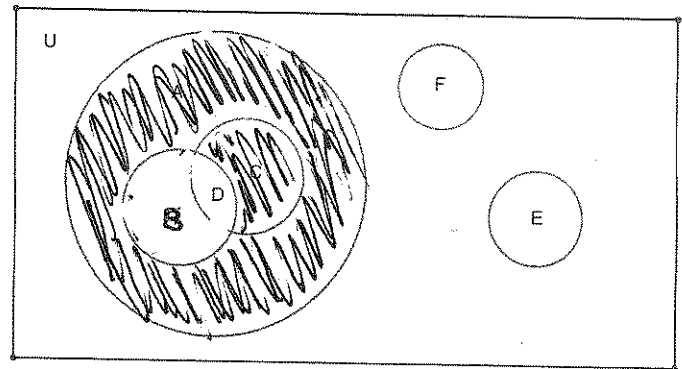
9. Trapezoids E 10. Parallelograms A 11. Squares D 12. Rhombuses C

Shade each venn diagram and shade the given set.

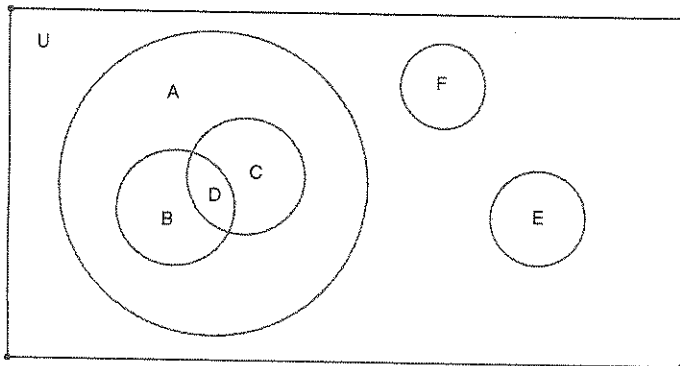
13. The set of all quadrilaterals with at least one pair of parallel sides



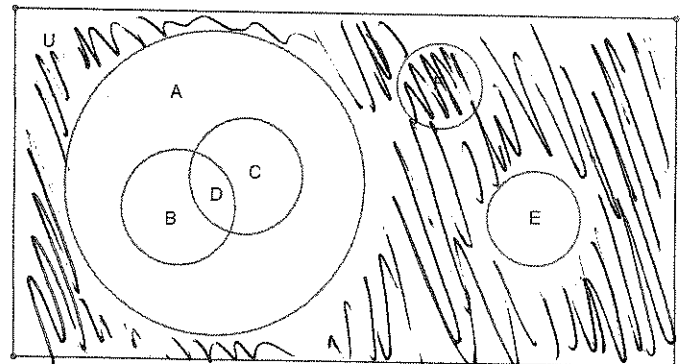
14. The set of all parallelograms with no right angles



15. The set of all rectangles that are trapezoids

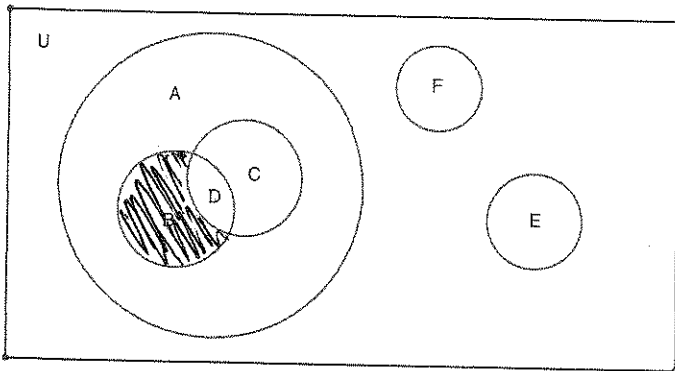


16. The set of all quadrilaterals that have no pairs of parallel sides

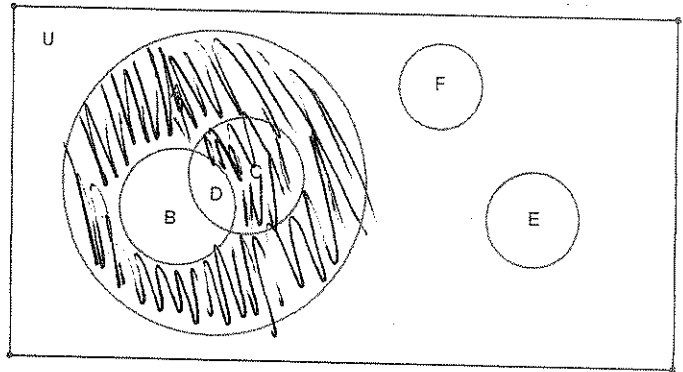


\emptyset

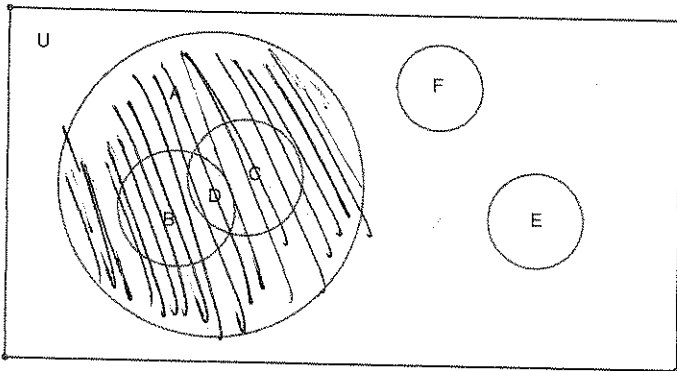
17. The set of all rectangles whose diagonals are not perpendicular



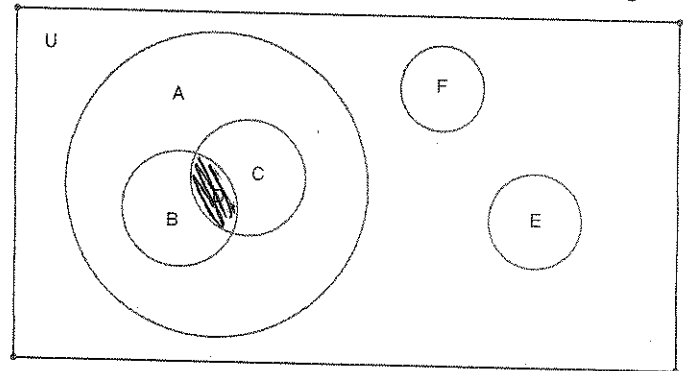
18. The set of all parallelograms whose diagonals are not congruent



19. The set of all quadrilaterals whose diagonals bisect each other



20. The set of all parallelograms whose diagonals are perpendicular and congruent



21. The measure of an exterior angle of a regular polygon is $12x - 6$. The measure of a second exterior angle of the same polygon is $8x + 6$. Identify the polygon (how many sides)?

$$\begin{aligned} 12x - 6 &= 8x + 6 \\ -8x & \quad +6 \quad -8x + 6 \\ 4x &= 12 \\ x &= 3 \end{aligned}$$

$$\sqrt{30^\circ} = 30^\circ$$

$$\frac{360}{n} = 30^\circ$$

DODECAGON
12 SIDES

22. A regular polygon has obtuse exterior angles. How many sides does the polygon have?

TRIANGLE - 3 SIDES

$$\frac{360}{n} > 90$$

$$360 > 90n$$

$$4 > n$$

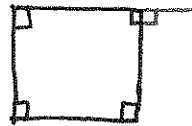
23. Of the regular polygons with obtuse interior angles, which has the largest exterior angle?

# OF SIDES	INT. \angle	EXT. \angle
3	60°	120°
4	90°	90°
5	108°	72°

PENTAGON

24. Is there a regular polygon with an interior angle congruent to an exterior angle? If so, draw a figure to illustrate.

YES, SQUARE



25. Can the sum of the angle measures of a polygon be any or all of the following: JUSTIFY YOUR SOLUTION.

a. 10,180°

$$\begin{aligned} 180(n-2) &= 10,180 \\ n-2 &= 56.555... \\ \text{NO!} \end{aligned}$$

$$180(n-2) = 18,180$$

B. 18,180°

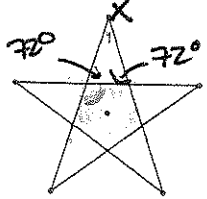
$$\begin{aligned} n-2 &= 101 \\ n &= 103 \\ \text{YES!} \end{aligned}$$

c. 15,660°

$$180(n-2) = 15,660$$

$$\begin{aligned} n-2 &= 87 \\ n &= 89 \\ \text{YES!} \end{aligned}$$

26. The star is formed by extending the sides of a regular pentagon. Find the $m\angle 1$ using the given information.



$$\begin{array}{r}
 180 = 72 + 72 + x \\
 -144 \quad -144 \\
 \hline
 36 = x \quad \boxed{36^\circ}
 \end{array}$$

27. The sum of the measures of four angles of a pentagon is 498° . What is the measure of the unknown angle?

$$\begin{array}{r}
 540 \\
 - 498 \\
 \hline
 \boxed{42^\circ}
 \end{array}$$

28. The sum of the measures of nine angles of a decagon (10 sides) is $1,320^\circ$. What is the measure of the unknown angle?

$$\begin{array}{r}
 180(n-2) = 180(8) = 1440 \\
 -1320 \\
 \hline
 \boxed{120^\circ}
 \end{array}$$

29. Three angles of a hexagon are congruent. The other three angles are also congruent. Each of the first three angles has a measure twice that of one of the second three angles. What is the measure of each angle of the hexagon?

$$180(6-2) = 180(4) = 720$$

x = measure of one of the second $3\angle$ s

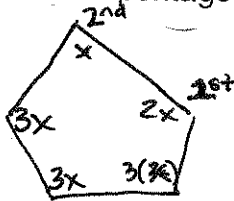
$2x$ = measure of one of the first $3\angle$ s.

$$\boxed{80^\circ \neq 160^\circ}$$

$$\begin{array}{l}
 3(2x) + 3(x) = 720 \\
 6x + 3x = 720
 \end{array}$$

$$\begin{array}{l}
 9x = 720 \\
 x = 80
 \end{array}$$

30. In a pentagon, the measure of one angle is twice that of a second angle. The remaining angles are congruent, each having a measure three times that of the second angle. What is the measure of each angle of the pentagon?



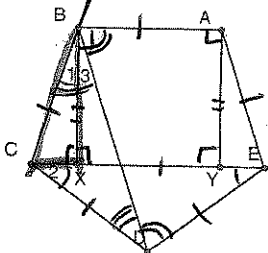
$$x + 2x + 3x + 3x + 3x = 540^\circ$$

$$12x = 540$$

$$x = 45$$

$$45^\circ, 90^\circ, 135^\circ$$

31. ABCDE is a regular pentagon and ABXY is a rectangle. Find



A. $m\angle 1 = 18^\circ$

B. $m\angle 2 = 36^\circ$

C. $m\angle 3 = 18^\circ$

$$\begin{array}{r}
 108 \\
 - 90 \\
 \hline
 18
 \end{array}$$

$$\begin{array}{r}
 108 \\
 - 72 \\
 \hline
 36
 \end{array}$$

