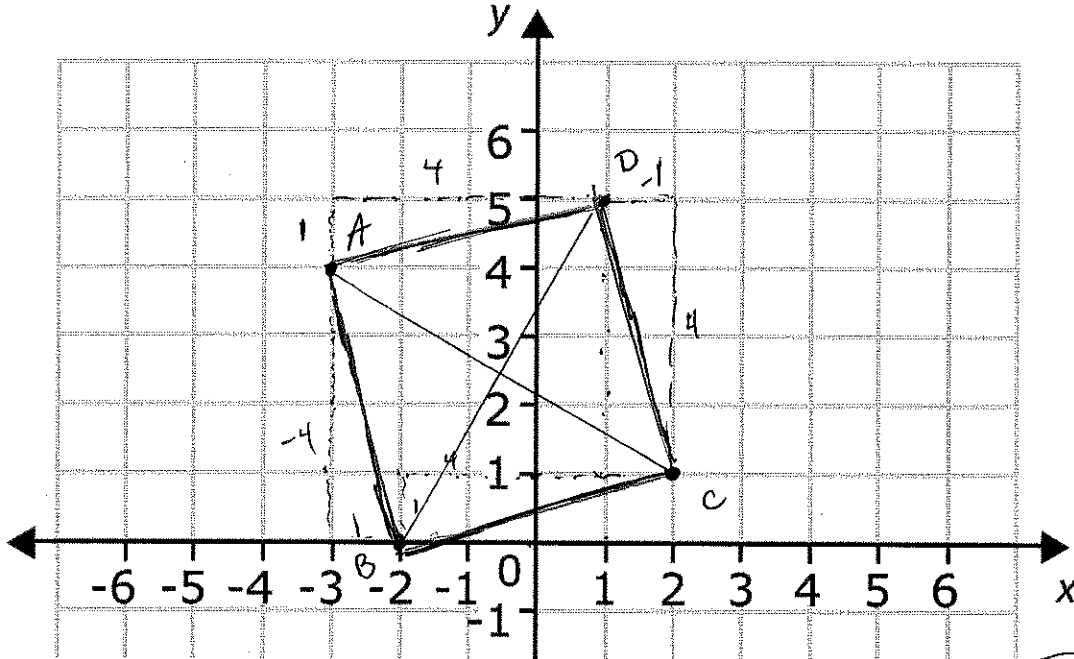


Classify the quadrilateral formed by the points A(-3,4) B(-2,0) C(2,1) and D(1,5).



1. Is it a parallelogram? Justify your answer with numbers.

• Slope of \overline{AD} : $\frac{1}{4}$
 • Slope of \overline{BC} : $\frac{1}{4}$ same
 $\overline{AD} \parallel \overline{BC}$

Slope of \overline{AB} : $-\frac{4}{1}$ same
 Slope of \overline{DC} : $-\frac{4}{1}$ same
 $\overline{AB} \parallel \overline{DC}$

∴ yes!

#1 Alternate method:
 find diagonals' midpoints.
 Midpoint of \overline{AC} : $(\frac{-3+2}{2}, \frac{4+1}{2}) = (\frac{-1}{2}, \frac{5}{2})$
 Midpoint of \overline{DB} : $(\frac{1-2}{2}, \frac{5+0}{2}) = (\frac{-1}{2}, \frac{5}{2})$
 Same → yes!

2. Is it a rectangle? Justify your answer with numbers.

Are Diagonals \cong ?
 Distance of \overline{AC} : $3^2 + 5^2 = d^2$
 $9 + 25 = d^2$
 $34 = d^2$
 $\sqrt{34} = d$

Distance of \overline{BD} : $3^2 + 5^2 = d^2$
 $9 + 25 = d^2$
 $34 = d^2$
 $\sqrt{34} = d$ same - yes!

#2 Alternate method
 Slope of \overline{AD} : $\frac{1}{4}$
 Slope of \overline{DC} : $-\frac{4}{1}$ opposite reciprocals
 So $\overline{AD} \perp \overline{DC}$.
 So, yes, rectangle.

3. Is it a rhombus? Justify your answer with numbers.

Are diagonals' slopes \perp ? (opposite reciprocals)
 Slope of \overline{AC} : $\frac{1-4}{2-3} = \frac{-3}{5}$
 Slope of \overline{BD} : $\frac{5-0}{1-2} = \frac{5}{3}$ negative, flipped
 So $\overline{AC} \perp \overline{BD}$. so yes, ABCD is a rhombus.

4. So what type of quadrilateral is it? Explain.

A Square. It is a parallelogram (#1), a rectangle (#2), and a rhombus (#3) because it has the properties of each.

CO-C11a

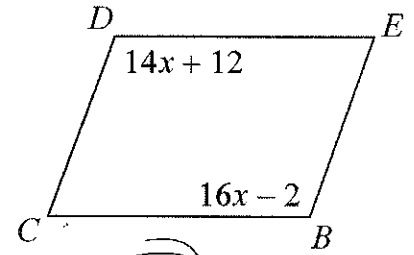
5. CDEB is a parallelogram. Find the measure of $\angle E$ makes 180° with $\angle B$.
 \hookrightarrow opposite angles \cong

$$\begin{aligned} \angle D &\cong \angle B \\ 14x + 12 &= 16x - 2 \\ -14x &\quad -14x \\ \hline 12 &= 2x - 2 \\ 12 &\quad +2 \\ \hline 14 &= 2x \\ \frac{14}{2} &= \frac{2x}{2} \\ 7 &= x \end{aligned}$$

$$\begin{aligned} \angle B &= 16x - 2 \\ \angle B &= 16(7) - 2 \\ \angle B &= 112 - 2 \\ \angle B &= 110^\circ \end{aligned}$$

So if $\angle B$ is 110°

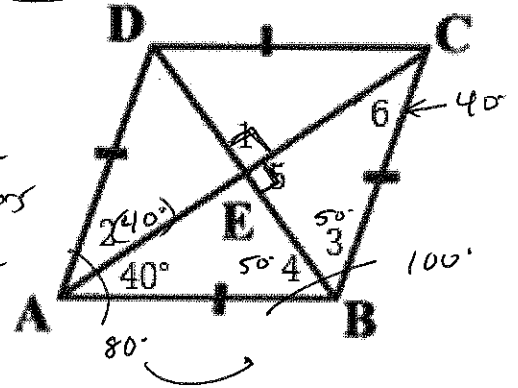
$$\begin{aligned} \angle E &= 180^\circ \\ &- 110^\circ \\ \hline &70^\circ \end{aligned}$$



6. ABCD is a rhombus. Connect the equal values in the lists below. Not all the measures will be used, and some are used more than once.

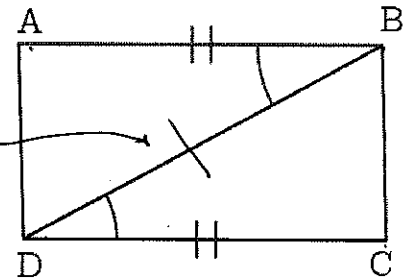
Angles	Measures
1	40°
2	50°
3	30°
4	45°
5	90°
6	60°

Rhombus:
 - diagonals are angle bisectors
 - diagonals are \perp



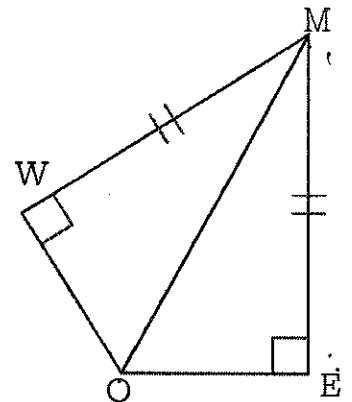
CO-B8a

7. Which of the triangle congruence shortcuts proves these triangles congruent? **SAS**
 $\overline{AB} \cong \overline{DC}$ (side) $\overline{OB} \cong \overline{DB}$ (side) shared side
 $\angle O \cong \angle B$ (angle)



8. Complete the congruence statement: $\triangle ABD \cong \triangle CDB$

9. Which of the triangle congruence shortcuts proves these triangles congruent? Right triangles... so... legs are \cong and hypotenuse is shared... so, **HL!**



10. Complete the congruence statement: $\triangle MEO \cong \triangle MWO$

CO-B6b

11. $\triangle CAT$ (not shown) undergoes a composition of transformations. First it translated under the rule $(x, y) \rightarrow (x - 3, y + 2)$ and is then rotated 180° about the origin to create $\triangle C'A'T'$. Is $\triangle CAT \cong \triangle C'A'T'$? Explain. rigid rigid

Yes, $\triangle CAT \cong \triangle C'A'T'$ because translations and rotations are both rigid motions / transformations and those do not change shape or size.