Lines and Angles

1. Point shows position.
   • A

2. Straight line is a continuous set of points going on forever in both directions:

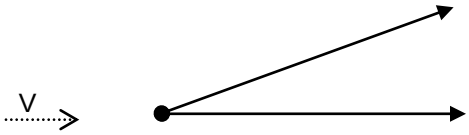
3. Ray is a line with one endpoint. The other goes on forever.

G 

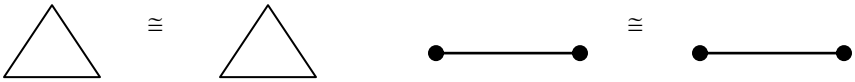
4. Line segment is a line with two endpoints.

J  K

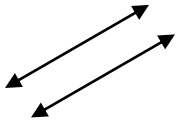
5. Vertex is the <u>point</u> where two rays meet to form an angle.

Vertex V 

6. Congruent means the same size, shape, angles, lengths… **symbol ≅**



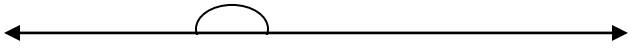
7. Parallel lines run along each other <u>but never cross</u>. **Symbol is ||**



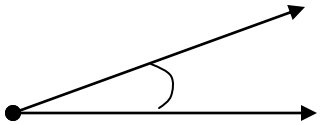
8. Angle is a figure formed by two rays with a common end point.

9. **Right** angles measure **90°**.

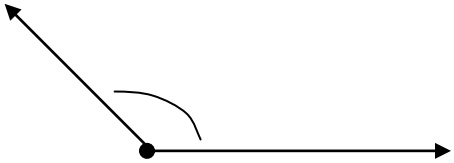
10. **Straight** angle is an angle that measures **180°**, a line.

 180°

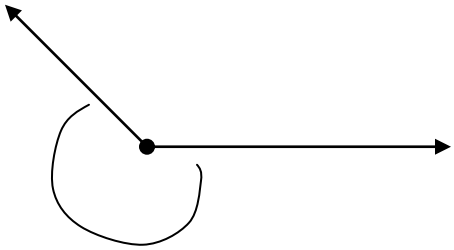
11. **Acute** angles measure **between 0° and 90°.**



12. **Obtuse** angles measure **between 90° and 180°.**

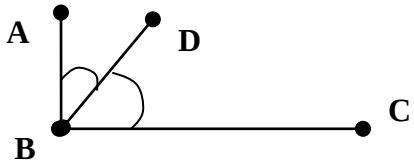


13. **Reflex** angles measure **between 180º and 360º**



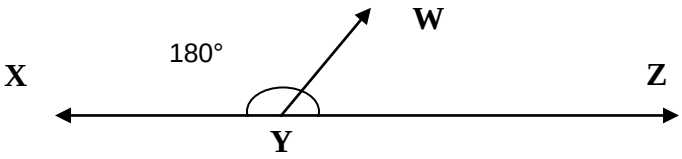
14. **Complementary** angles are two angles that add to **90°**.

∠ABD + ∠DBC = 90°

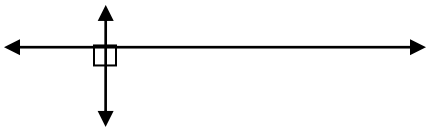


15. **Supplementary** angles are two angles that add to **180°**.

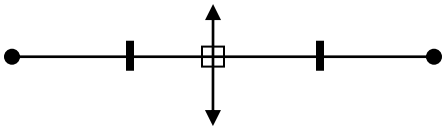
∠XYW+∠WYZ = 180°



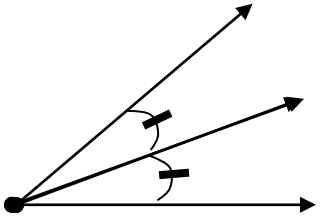
16. **Perpendicular** lines meet at 90º.



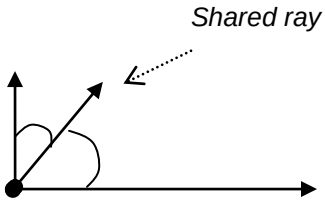
17. Perpendicular Bisector **cuts lines in half** creating two equal segments (congruent). Symbol = ▌



18. Angle bisectors cut angles in half. The angles are the same measure (congruent).
19.

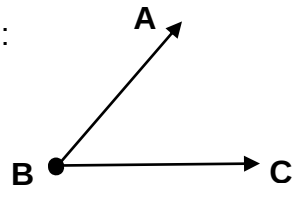


20. Adjacent angles share a ray.



Measuring, labelling and naming angles:

Example:

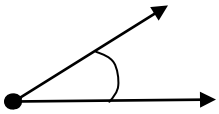


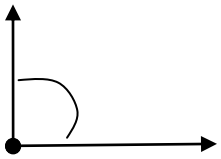
Acute angle

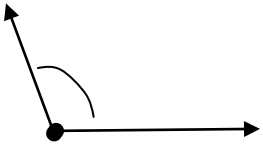
$m\angle ABC = 45^0$

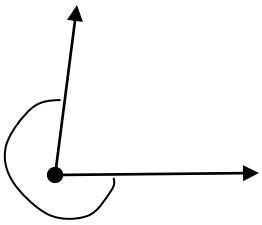
This is read the measure of angle ABC is 45^0

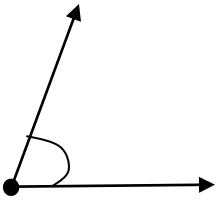
Practice: Find the measure of each angle, label it and state what type of angle it is.

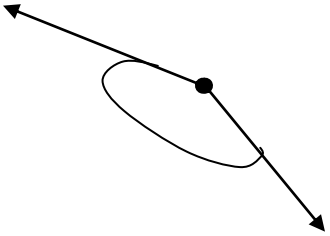
❶ 

❷ 

❸ 

❹ 

❺ 

❻ 

Practice: Use a protractor to construct the following angles.

❶ 55^0 ❷ 100^0 ❸ 90^0

❹ 230^0 ❺ 78^0 ❻ 155^0

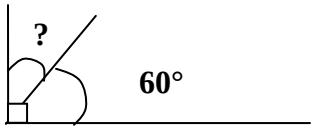
❼ 180^0 ❽ 87^0 ❾ 23^0

Solving Angles:

We use the properties of lines and angles to find unknown angles.

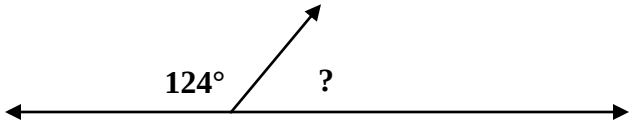
Examples:

Complementary <u>angles add to 90°</u>



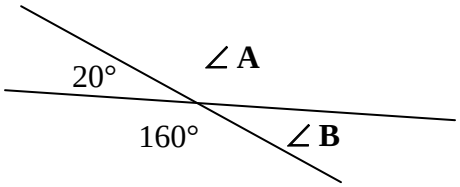
Therefore, ? = 90° - 60° = 30°

Supplementary <u>angles add to 180°</u>



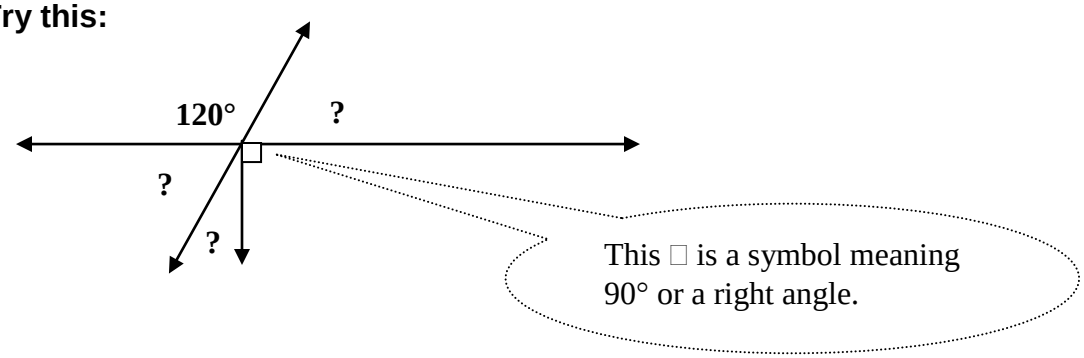
Therefore, ?= 180° - 124 = 56°

Vertically opposite angles are congruent (equal).



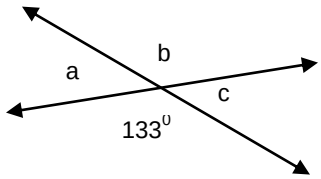
∠A is opposite 160°; therefore ∠A = 160°
and ∠B is opposite 20°; therefore ∠B = 20°

Try this:



Practice: Without a protractor, using the properties of lines and angles, find the missing angles. Explain your reasoning.

❶



Explanation _____

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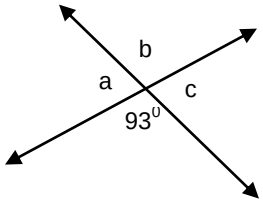

Explanation _____

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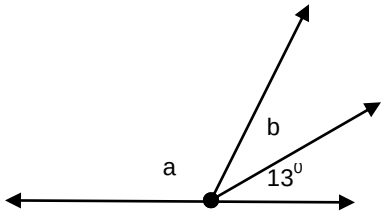

Explanation _____

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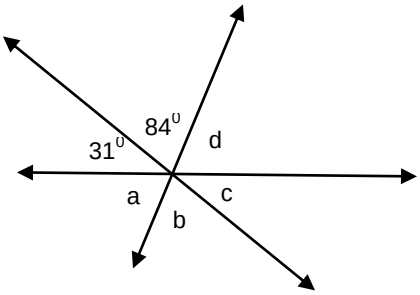

Explanation _____

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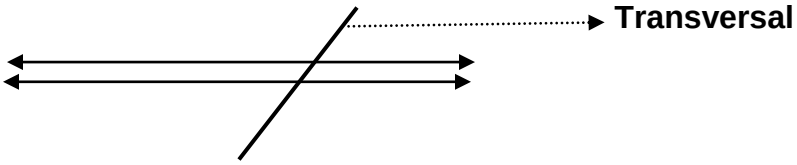
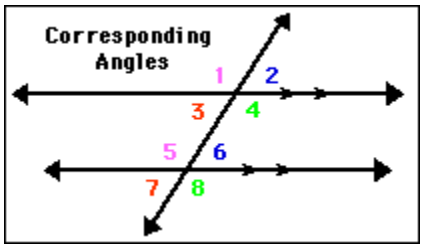
Parallel Lines and Transversals

A transversal is a line that cuts through two parallel lines.

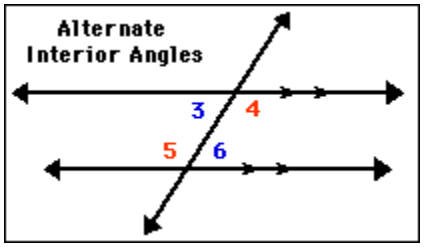


Properties of Parallel Lines and Transversals:



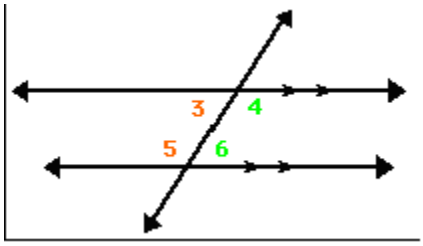
Corresponding angles are equal

$\angle 1 = \angle 5$
$\angle 2 = \angle 6$
$\angle 3 = \angle 7$
$\angle 4 = \angle 8$



Alternate interior angles are ___equal_____

$\angle 3 = \angle 6$
$\angle 4 = \angle 5$



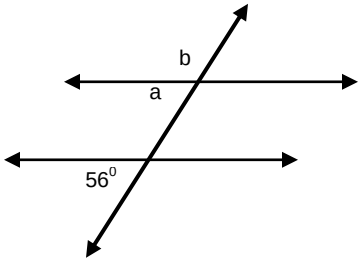
Interior angles on the *same side* of the transversal add up to 180°

$\angle 3 + \angle 5 = 180$
$\angle 4 + \angle 6 = 180°$

The above properties for parallel lines and transversals can be used to find missing angles without a protractor.

Practice: Find the missing angles without a protractor. Explain your reasoning.

❶



Explanation _____

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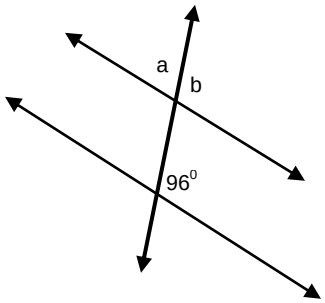

Explanation _____

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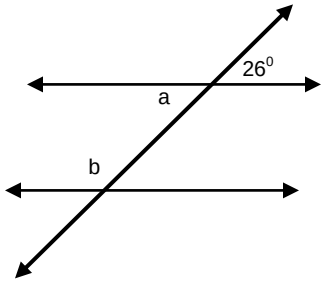

Explanation _____

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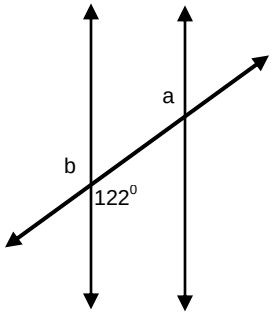

Explanation _____

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Practice: Find the missing angles.

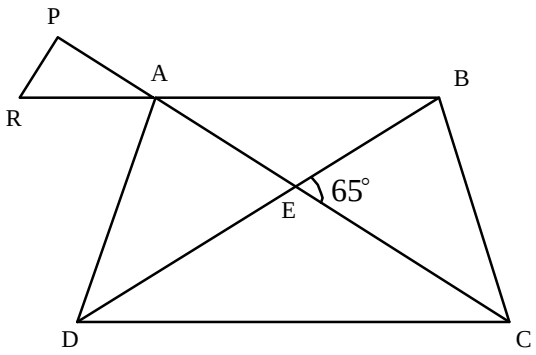
❶

In the figure on the right, $m\,\overline{AE} = m\,\overline{BE}$.

Angle BEC is 65°.
Angles PAC and RAB are straight angles.

What is the measure of angle RAP?

Give a reason (in words) for each step or calculation.

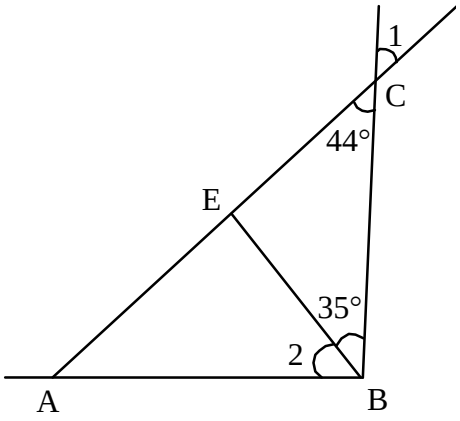


❷

Given the figure on the right and the following information:

Rays BA and BC are perpendicular, angle BCE measures 44° and angle EBC measures 35°.

a) Explain why angle 1 measures 45°.
b) Explain why angle 2 measures 50°.



Lines and Angles Assignment

Lines and Angles Assignment: Put this assignment in you duo-tang.

Construct the following on paper.

Part A: Lines

1. Construct line segment AB = 7 cm. Perform a **Perpendicular bisector** to the line segment.
2. Construct parallel lines CM and HN 3 cm apart.
3. Construct two **congruent** lines CD and EF = 6.6 cm.

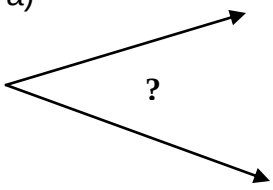
Part B: Angles

4. Construct ∟ABC = 110°. What is this angle called?
5. Construct ∟EFG = 210°. What type of angle is this?
6. Construct ∟HIJ = 75°. What is this angle called?
7. ∟ABC = 90°. What type of angle is this?
8. **Bisect** one of the angles above.
9. Construct ∟BGN = 180°. What type of angle is this?
10. Construct examples of **complementary** and **supplementary** angles. Explain what type of angles they are.

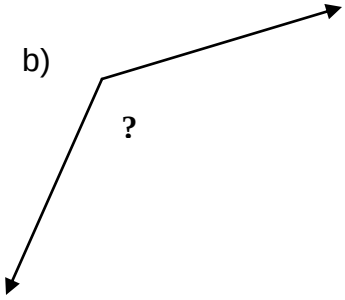
Part C: Answer the following on these pages.

11. What is the measure of the following angles? What type of angles are they? How do you know?

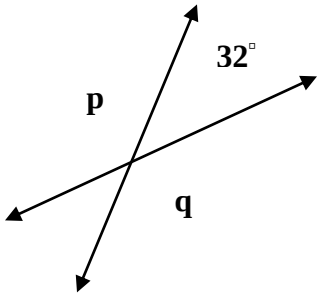
a)



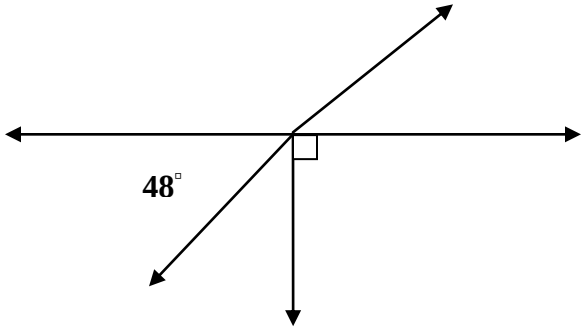
b)



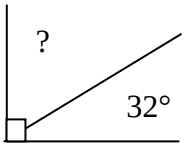
12. What is the measure of **angles p** and **q**? Justify your answer and **do not use a protractor.**



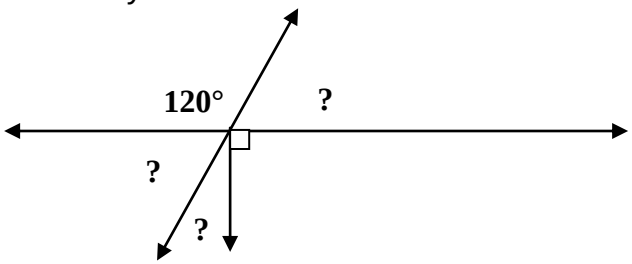
13. Without using a protractor, what are all the missing angles?



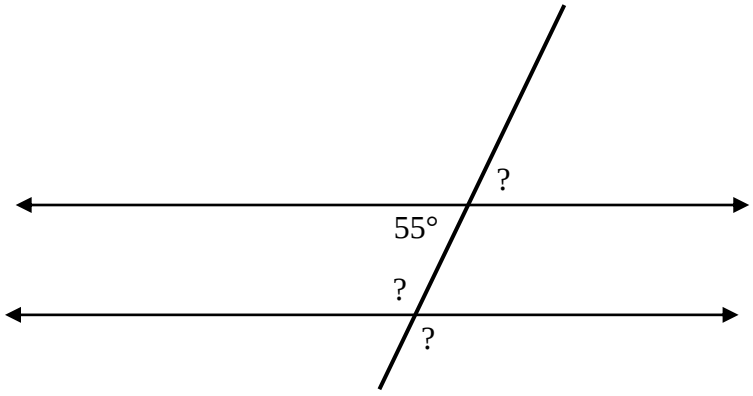
14. Solve the unknown angle. How do you know?



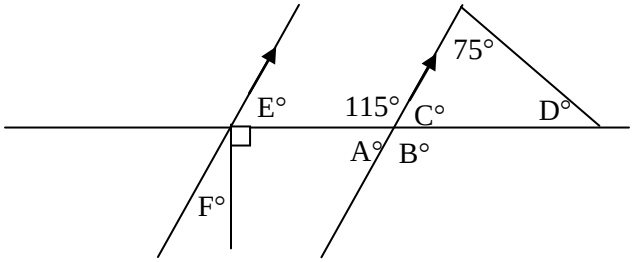
15. Solve the unknown angles. How do you know?



16. Solve the unknown angles. **How do you know?**



17. Solve the following angles. **Do not** use a protractor.



Answers:

a) A = Because	b) B = Because
c) C = Because	d) D = Because
e) E = Because	f) F = Because

Due _____