Mathematics Class Slides

Bronx Early College Academy

Christopher J. Huson PhD

13-22 September 2021

1.1 1st day of Geometry, Segment addition, 13-14 Sept

1.3 Segment addition, midpoint, 17 Sept

1.4 Number line situations, 20 Sept

1.5 Midpoint calculations; Isosceles triangles, 21 Sept

1.6 Angles and their measures, 22 September

1.7 Angles and their measures, 23 September

1.8 Angles addition problems, 24 September

1.9 Angles addition problems, 27 September

1.10 Angles addition problems, 28 September

1.11 PreTest: Angles, 29 September

1.12 PreTest: Angles, 30 September

Learning Target: I can measure and diagram my world

CCSS: HSG.CO.A.1 Know precise geometric definitions 1.1 Tuesday 13-14 Sept

Welcome back to school

Do Now: Measurement

1. Notebook first page: Name / Course / Instructor
2. Diagram people closest to you and their distance
3. Early finishers: Calculate diagonal distances

Supply list: Composition book, looseleaf, pencils & pens, compass and ruler, calculator; Optional: folder

Lesson: Points, line segments, length; Segment addition postulate

Homework: Diagram your bedroom (with measurements), or another room

Take class notes in a composition book

Use this notebook format (required)

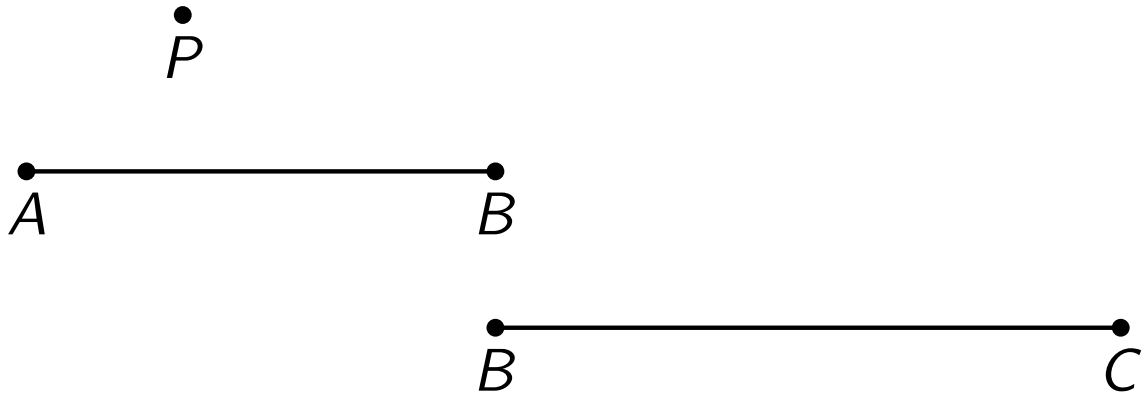
1. In the front, write your name, my contact info, your passwords
2. Each page in the top left corner:
   First+Last Name
   14 September 2021
   Learning Target: I can measure and diagram my world
3. Copy definitions using your own words
4. Write down example diagrams and problems

Point: a location, a dot, has no size; label with capital letter, P

Line segment: two points and all the points between them; label with *end points* and a bar, $\overline{AB}$

Example: Points and line segments

Shown points P, A, B, C, line segments $\overline{AB}$, $\overline{BC}$



Given $AB = 3$, $BC = 4$.

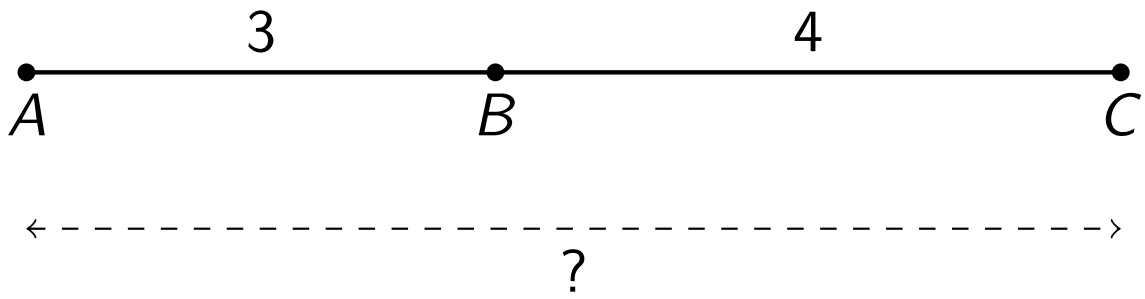
Notation: the length of a line segment is written as the two end points without a bar over them, AB.

Example: Points and line segments

Segment Addition Postulate

Shown *collinear* points A, B, C. Given $AB = 3$, $BC = 4$.

Find AC.



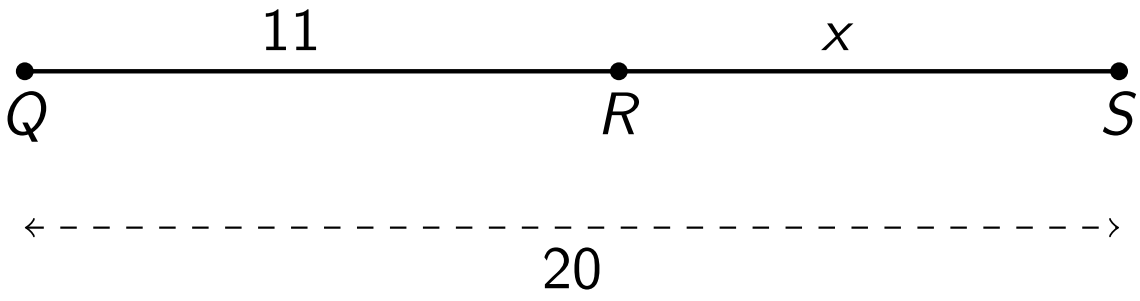
Definition: Points are *collinear* when they lie on a straight line.

Example 2: Points and line segments

Segment Addition Postulate

Given collinear points Q, R, S, with $QR = 11$, $QS = 20$.

Find RS.

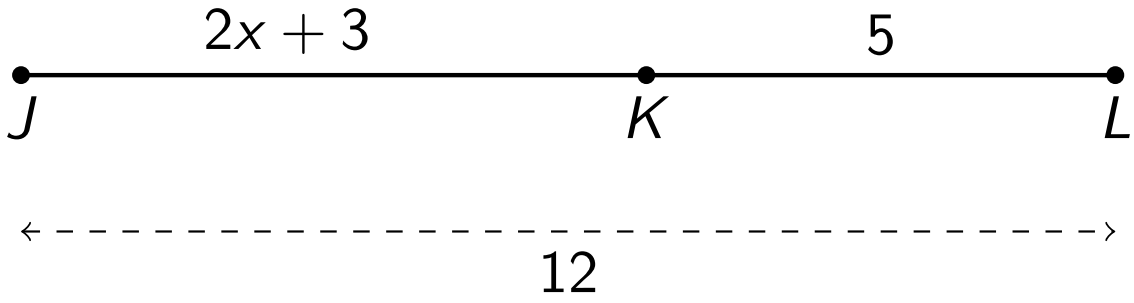


1. How would you check your answer?
2. Which equation represents the situation?

$11 + x = 20$ $\qquad\qquad$ $x = 20 - 11$

Example 3: Segment addition postulate

Given $\overline{JKL}$, $JK = 2x + 3$, $KL = 5$, $JL = 12$. Find x.



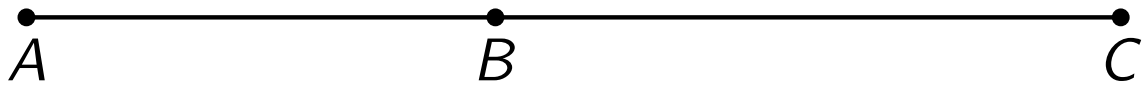
1. Write down an equation to represent the situation.

2. Solve for x.

3. Check your answer.

Example 4 (challenge): Segment addition postulate

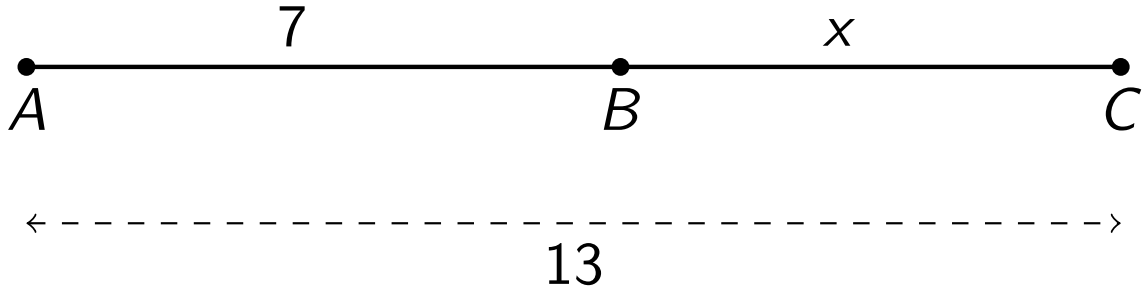
Given $\overline{ABC}$, $AB = 3x - 7$, $BC = x + 5$, $AC = 14$. Find AB.



Learning Target: I can solve for segment lengths

CCSS: HSG.CO.A.1 Know precise geometric definitions 1.3 Friday 17 Sept

Do Now: Given collinear points A, B, C, with $AB = 7$, $AC = 13$.



1. Which equation most simply represents the situation?

   $7 + x = 13$ $\qquad\qquad$ $x = 13 - 7$

2. Find BC.

Classwork: Handout (pre-quiz for 6th period)

Lesson: Point, line segment, end point, collinear, distance or length; line, ray, plane, coplanar, *congruent* line segments

Midpoints, bisectors, practice segment addition situations

Casio fx-9750GII calculator - due Friday 1 October

In the high school at BECA we use the Casio fx-9750GII.

It is allowed on the Regents exams, SAT tests, and International Baccalaureate exams.

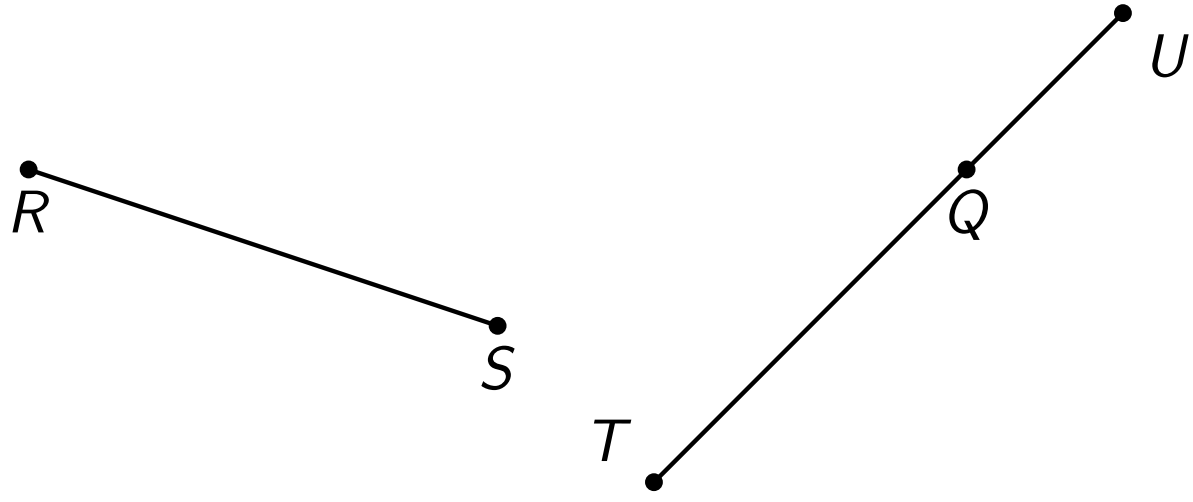
You may use a different calculator in Geometry if you prefer, but I recommend buying the Casio fx-9750GII.

(see me if buying a calculator is a hardship for your family)

Review: points, segments, length

Give an example of each geometric object. Use proper notation.

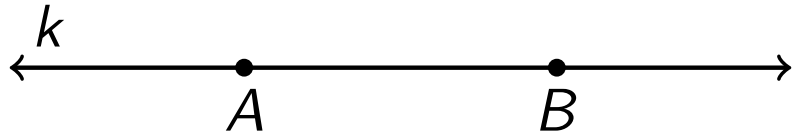
1. point
2. line segment
3. end point
4. three collinear points



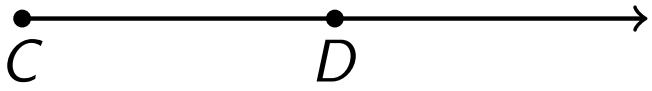
5. Given $TQ = 1.4$, $QU = 0.6$. Find TU.

More definitions: lines, rays, planes

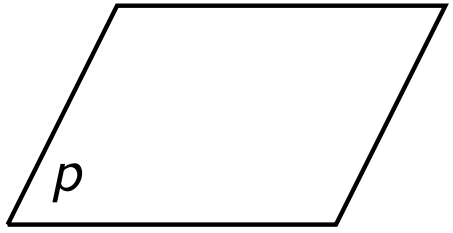
A *line* extends infinitely in both directions, $\overleftrightarrow{AB}$.
(sometimes labeled with a small letter, for example, line k)



A *ray* has one end point and extends infinitely in one direction, $\overrightarrow{CD}$.

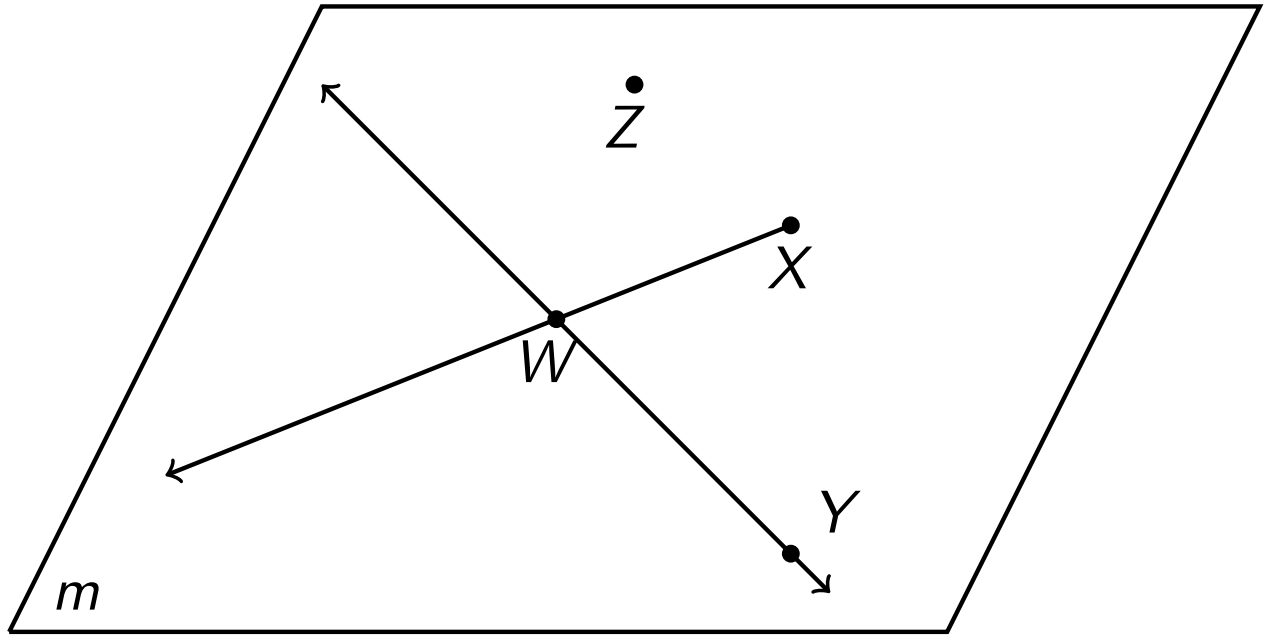


A *plane* is flat and extends infinitely in two directions, p.



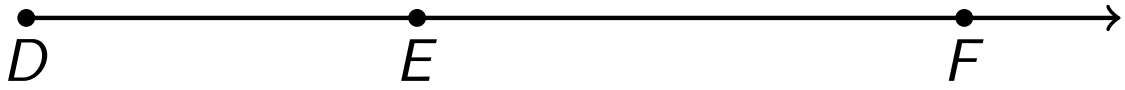
Several objects are shown in a plane

1. T F The name of the plane is m
2. T F The line $\overleftrightarrow{WY}$ is in the plane
3. T F The ray $\overrightarrow{WX}$ is shown in the plane
4. T F Points W, X, and Z are collinear



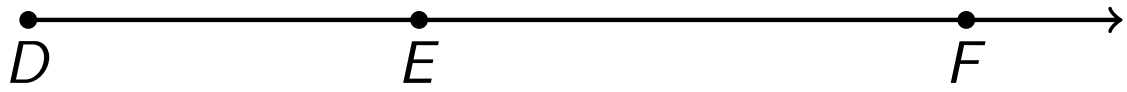
Solve for length using the Segment Addition postulate

Given $\overrightarrow{DEF}$, $DE = x + 1$, $EF = 9$, $DF = 3x$. Find DE.



Solve for length using the Segment Addition postulate

Given $\overrightarrow{DEF}$, $DE = x + 1$, $EF = 9$, $DF = 3x$. Find DE.



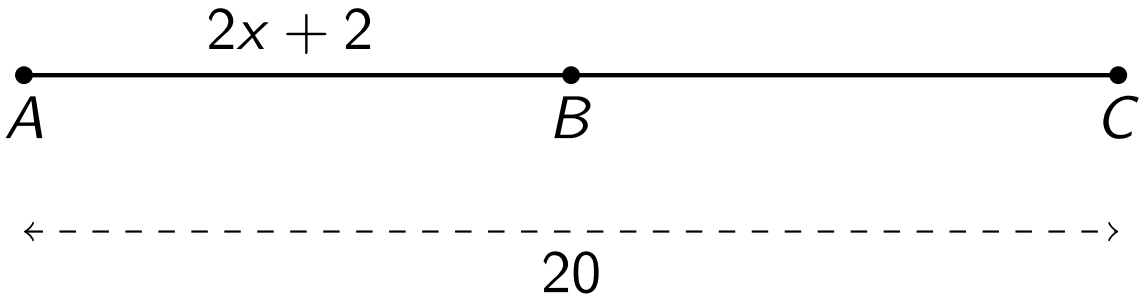
1. Sketch and label the situation
2. Write a geometric equation
3. Substitute algebraic values
4. Solve for x
5. Answer the question
6. Check your answer

The midpoint of a line segment

Also called the bisector

Given $\overline{ABC}$, with $AB = 2x + 2$, $AC = 20$. $AB = BC$

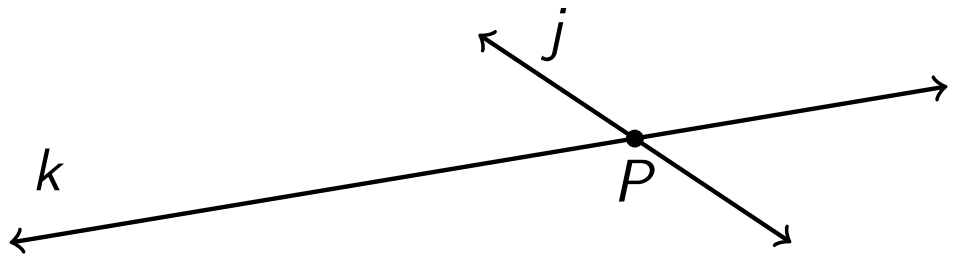
Find x.



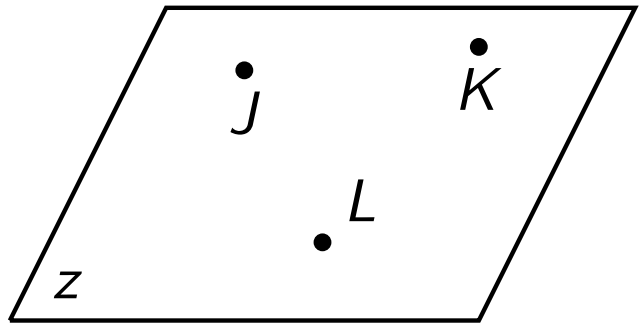
Definition: the *midpoint* or *bisector* of a line segment divides it exactly in half.

More definitions: intersections, coplanar

Two lines *intersect* if they cross. Their common point is the *intersection*. (shown here, lines j and k intersect at point P)



Coplanar means to lie in the same plane. Three points are always coplanar, but four points may not be.

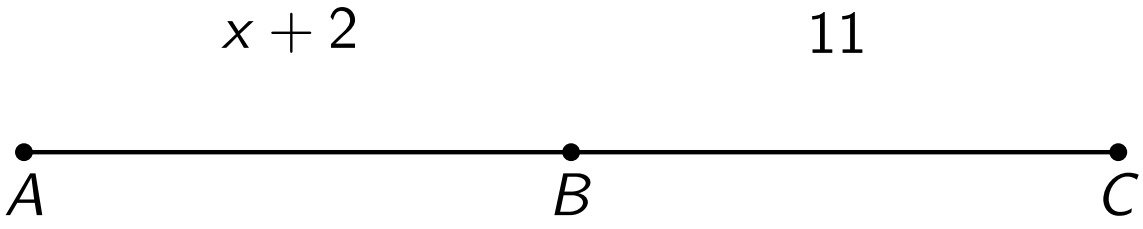


Learning Target: I can work with a number line

CCSS: HSG.CO.A.1 Know precise geometric definitions 1.4 Monday 20 Sept

Do Now: Midpoint calculations

Given point B is the midpoint of $\overline{AC}$, with $AB = x + 2$, $BC = 11$. Find x.



1.3 Segments scores in Jumprope. Make up if absent

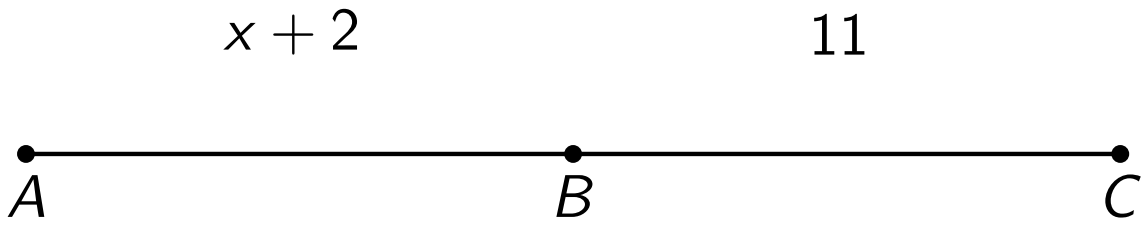
Lesson: Number lines, distance and length, absolute value

Practice midpoints and segment addition situations

A bisector creates two line segments with the same length

Congruent line segments are the same length

Given point B is the midpoint of $\overline{AC}$, with $AB = x + 2$, $BC = 11$.
Find x.

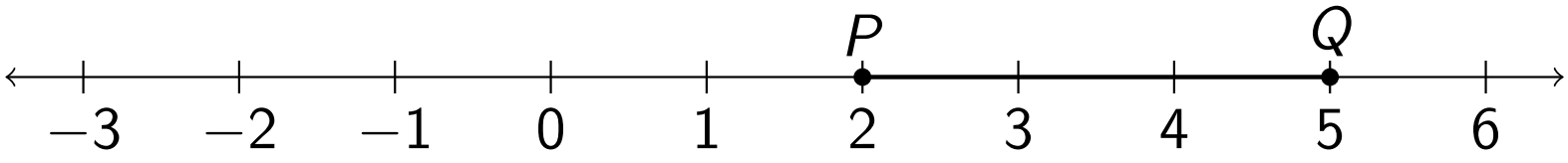


Definition: *Congruent* means equal in length. $\overline{AB} \cong \overline{BC}$
We mark congruent segments in diagrams with cross hatch marks.

A number line is useful for calculating length or distance

Take the difference in the points' values

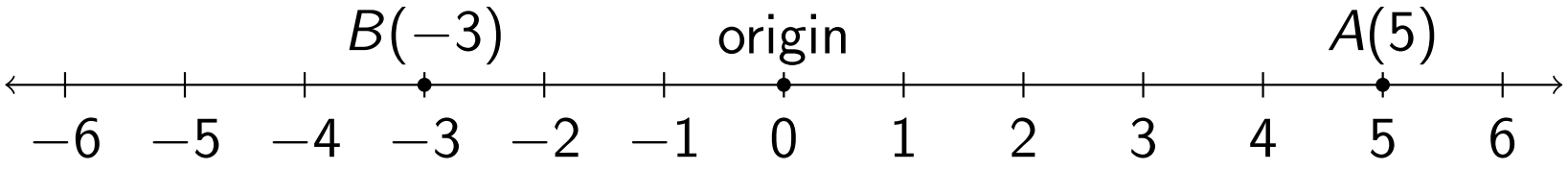
Given $\overline{PQ}$ as shown on the number line.



What is the distance on the number line between the points P and Q?

Absolute value: the distance from a point to the origin

Always a positive number (or zero)



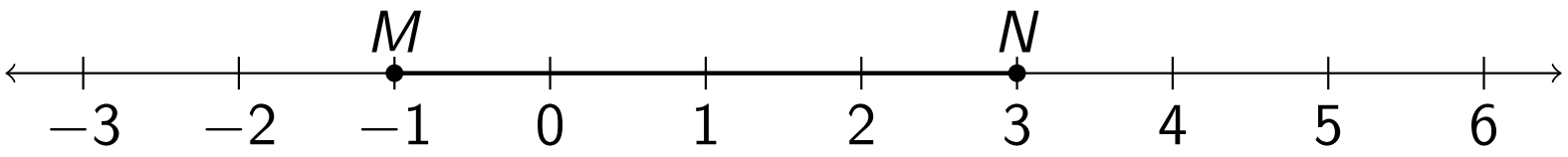
The absolute value of 5 is 5. $|5| = 5$

The absolute value of -3 is 3. $|-3| = 3$

Negative number practice on a number line

Take the difference in the points' values. Check by counting the marks.

Given $\overline{MN}$ with $M(-1)$ and $N(3)$, as shown on the number line.



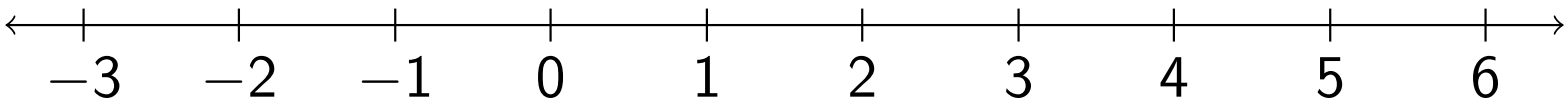
What is the length of the segment $\overline{MN}$? Show your work as an equation.

Can a length be a negative number?

Decimal practice on a number line

Mark the points then take the difference in the points' values.

Given $\overline{GH}$ with $G(1)$ and $H(4.5)$.

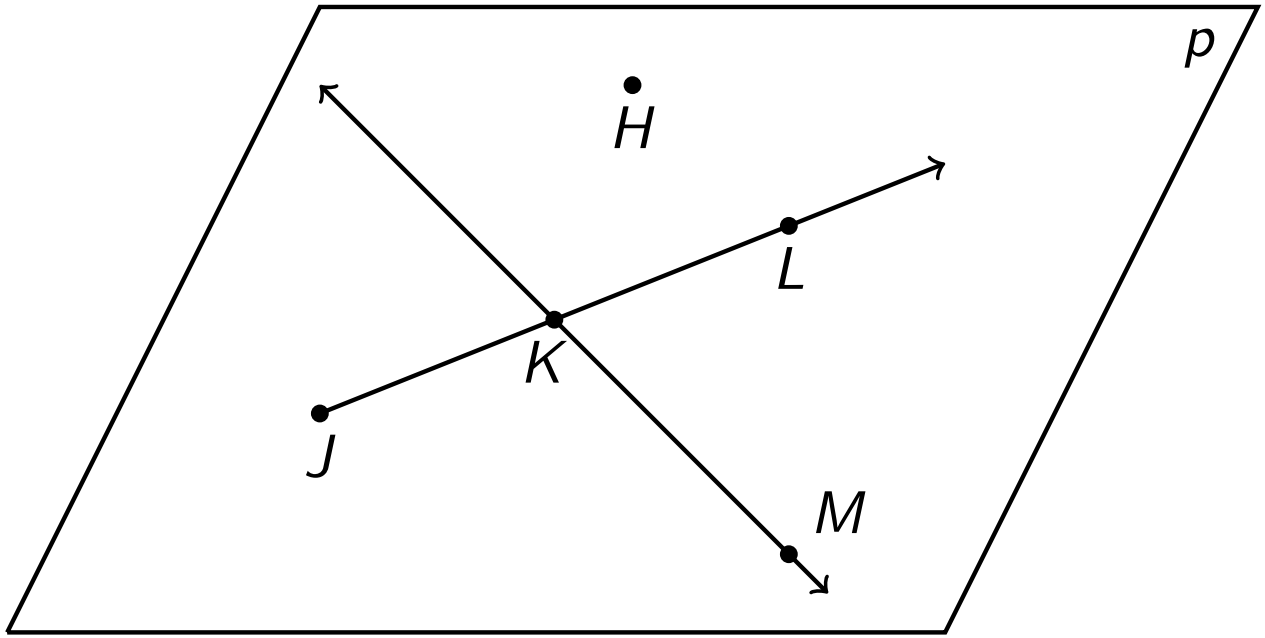


1. Mark and label the points and segment on the number line.
2. What is the length of the segment $\overline{GH}$? Show your work as an equation.

Identifying objects in a plane

Identify each item

1. The point H
2. The ray $\overrightarrow{JL}$
3. The name of the plane shown



Formal meanings of sketch, draw, and construct

1. *Sketch* is to make a freehand diagram of important features.

   Use a pencil to write carefully in your notebook or on paper.

2. *Draw* is to depict with accurate measures using ruler, protractor, and compass.

   For example, draw a diagram of your room.

3. *Construct* is a formal, logical process to create geometric figures using only a straightedge and compass.

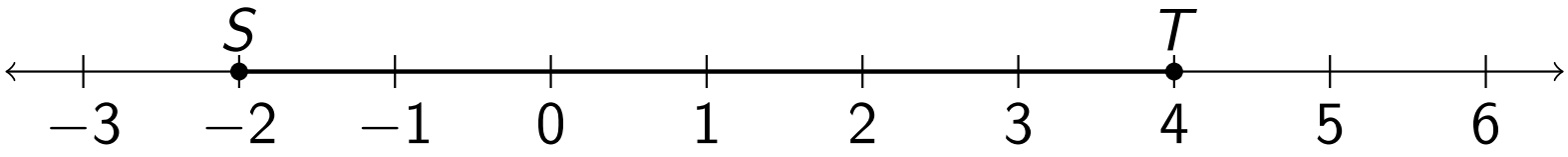
4. Drawn to *scale* means that all of the lengths are proportional. (e.g. a "scale model")

   Tests will often warn that diagrams are "not drawn to scale"

Learning Target: I can work with congruent segments

CCSS: HSG.CO.A.1 Know precise geometric definitions 1.5 Tuesday 21 Sept

Do Now: Given $\overline{ST}$ with $S(-2)$ and $T(4)$



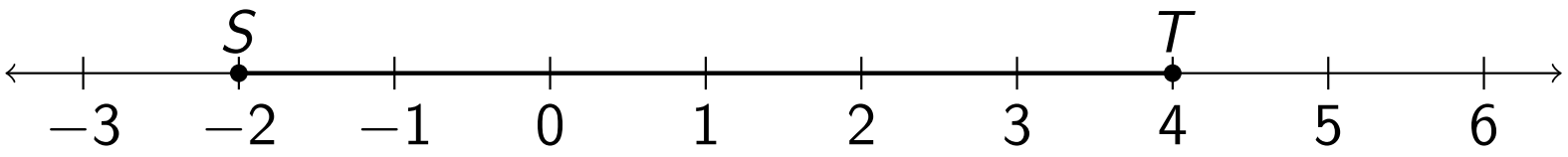
What is the length of the segment $\overline{ST}$? Show your work as an equation.

Lesson: Perimeter, congruent line segments in rectangles & isosceles triangles

Negative number practice on a number line

Take the difference in the points' values. Check by counting the marks.

Given $\overline{ST}$ with $S(-2)$ and $T(4)$, as shown on the number line.

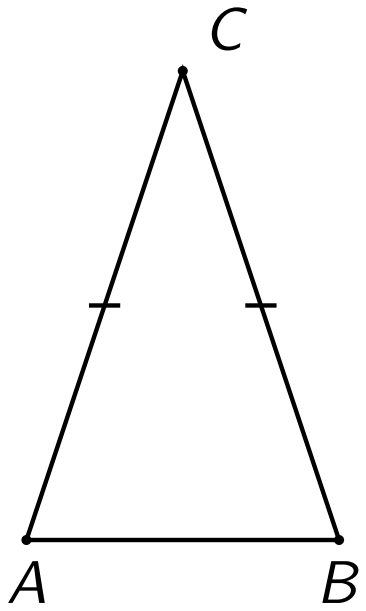


What is the length of the segment $\overline{ST}$? Show your work as an equation.

Why is "minus a negative" the same as add a positive?

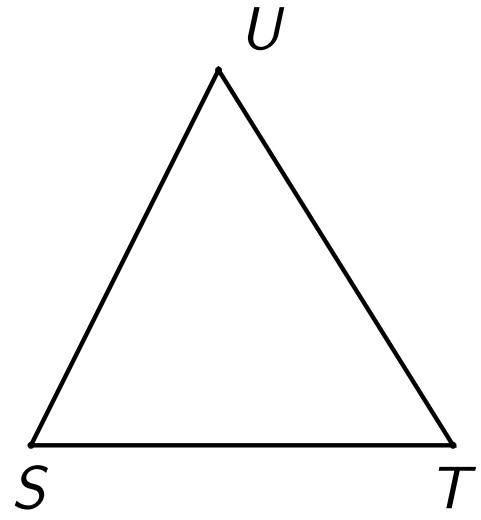
Use proper notation (including the bar over the letters)

Given $\triangle ABC$ write down two congruent line segments using proper notation.



On the diagram mark the congruent line segments with tick marks.

Given $\triangle STU$ with $\overline{ST} \cong \overline{TU}$.



Sketch an isosceles triangle

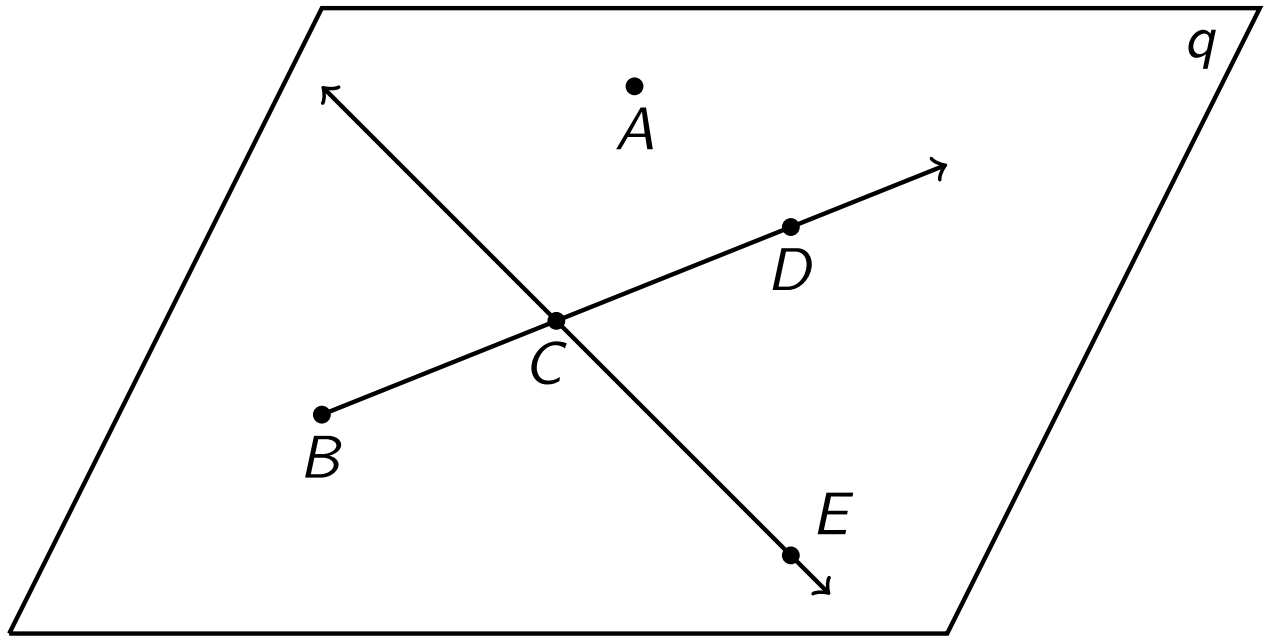
Mark the congruent sides with tick marks.

Draw a ray. (careful! which direction does it go?)

Given the points X and Y, draw $\overrightarrow{YX}$.

Identify each item.

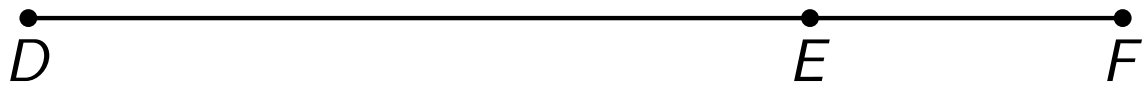
1. The point A
2. The ray $\overrightarrow{BD}$
3. The name of the plane



Apply the Segment Addition Postulate

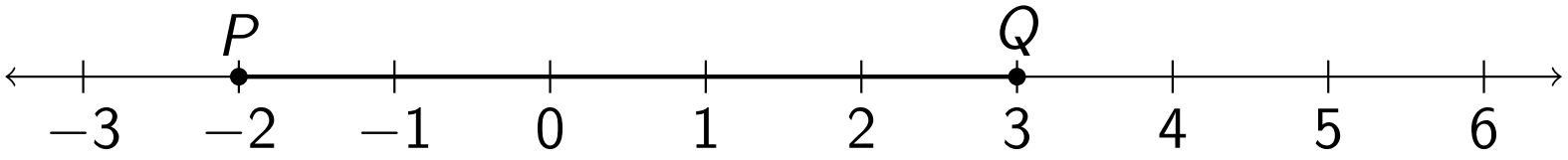
Show your work by marking the diagram and writing an equation.

Given $\overline{DEF}$, $DE = 8.5$, and $EF = 2.5$. Find DF.



Find the length of the line segment $\overline{PQ}$.

Given $P(-2)$ and $Q(3)$, as shown on the number line.



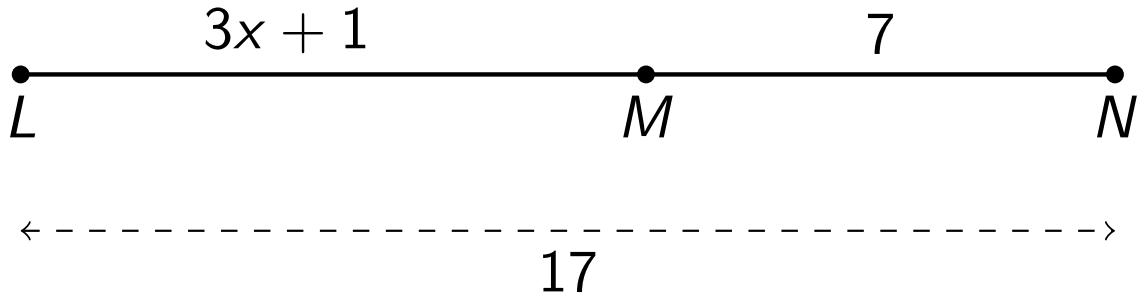
State an equation and the solution.

Check your work by counting the distance. Leave marks to show your work.

Learning Target: I can measure angles

CCSS: HSG.CO.A.1 Know precise geometric definitions 1.6 Wednesday 22 Sept

Do Now: Given $\overline{LMN}$, $LM = 3x + 1$, $MN = 7$, $LN = 17$. Find x.

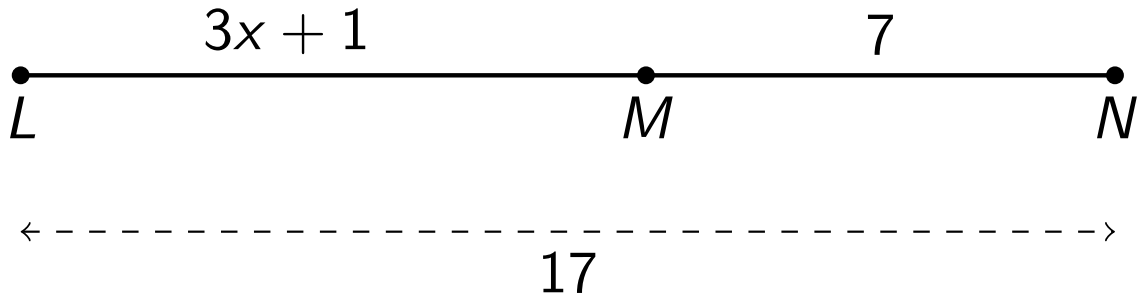


1. Write down an equation to represent the situation.
2. Solve for x.
3. Check your answer.

Lesson: Angle measures, internal, external, acute, obtuse, right

Solve for x using the segment addition postulate

Given $\overline{LMN}$, $LM = 3x + 1$, $MN = 7$, $LN = 17$. Find x.



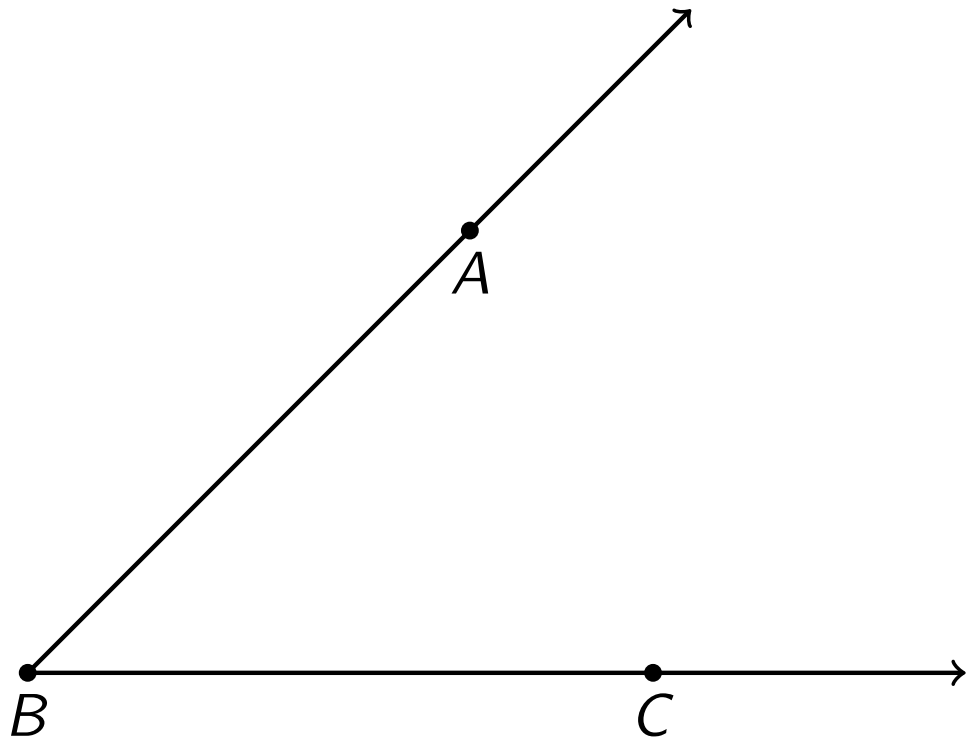
1. Write down an equation to represent the situation.

2. Solve for x.

3. Check your answer.

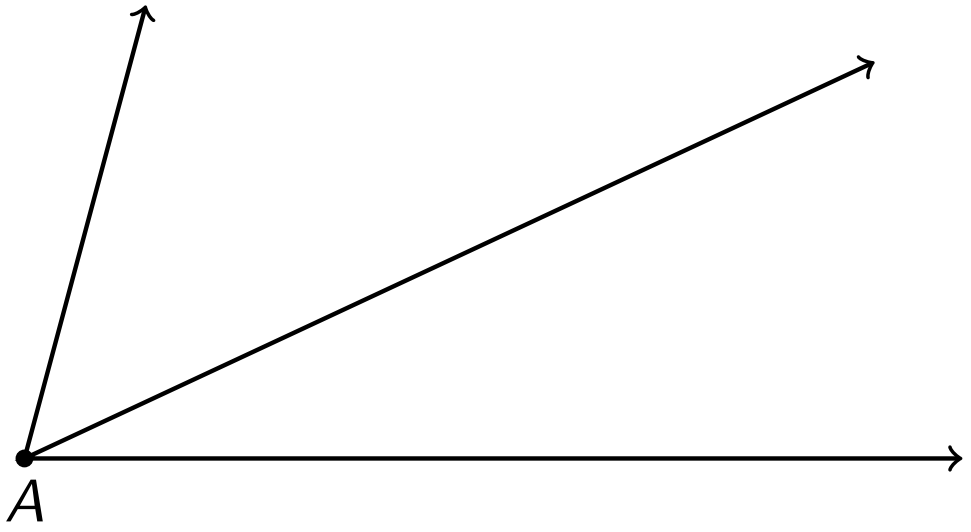
Angle: two rays with a common endpoint or vertex

Rays $\overrightarrow{BA}$ and $\overrightarrow{BC}$. Vertex B. Written notation is $\angle ABC$ or $\angle B$.



Angle measures: the Babylonian system of 360° in a circle

- A full rotation is 360° (a full "turn").
- A half turn (straight line) is 180°.
- 90° is a quarter turn or a *right* angle.
- *Acute* angles measure less than 90°. *Obtuse* angles measure more than 90°.
- *Adjacent* angles ("next to" each other) share a common ray and are external to each other.



Learning Target: I can measure angles

CCSS: HSG.CO.A.1 Know precise geometric definitions 1.7 Thursday 23 Sept

Do Now: Given M bisects $\overline{AB}$, $AM = 5x + 2$, $MB = 20$.

1. Mark the diagram with the values and tick marks
2. Write an equation and solve for x
3. Check your result

Lesson: Angle measures, angle addition postulate

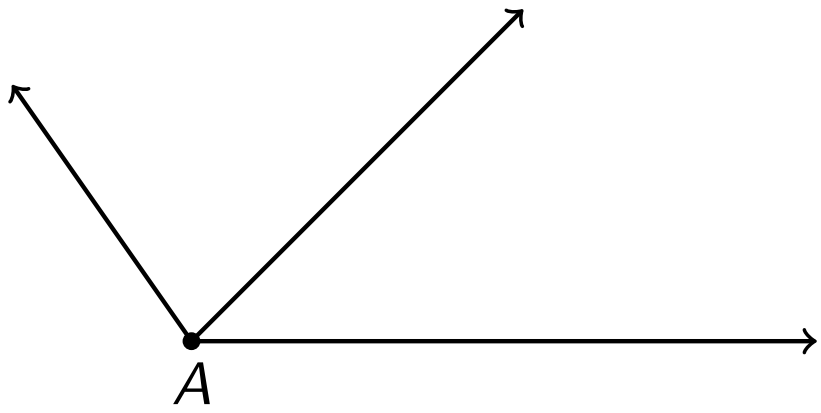
Solve for x given a bisector

Given M is the midpoint of $\overline{AB}$, $AM = 5x + 2$, $MB = 20$.

1. Mark the diagram with the values and tick marks
2. Write an equation and solve for x
3. Check your result

Angle addition postulate

For adjacent angles, the sum of their measures is the measure of their combined angle.
A *linear pair* are two angles that make a straight line.
Opposite rays have a common endpoint and make a line. (They form an angle measuring 180°).
Angles whose measures sum to 180° are *supplementary*.
Angles whose measures sum to 90° are *complementary*.

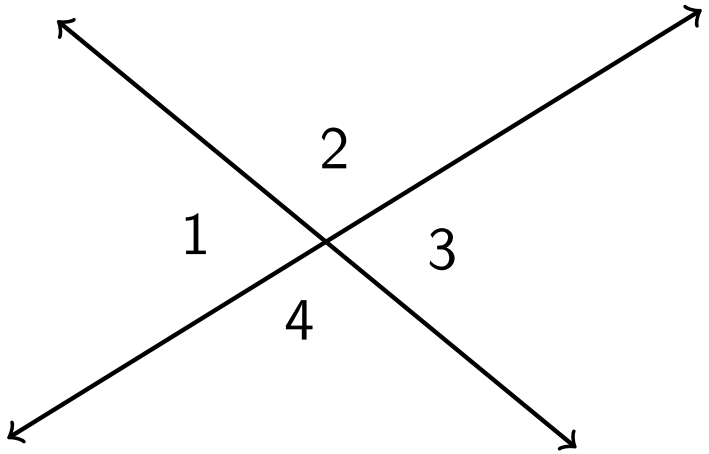


Learning Target: I can identify vertical angles

CCSS: HSG.CO.A.1 Know precise geometric definitions 1.8 Friday 24 Sept

Do Now: Given $\overline{RST}$, $RS = 3\frac{2}{3}$, and $RT = 9\frac{1}{3}$. Find ST.

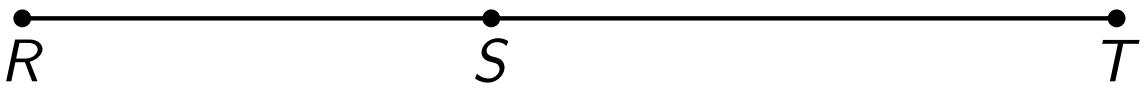
Definition: *Vertical angles* are angles opposite each other when two lines intersect. $\angle 1$ and $\angle 3$ are vertical angles, as are $\angle 2$ and $\angle 4$.



Lesson: Angle addition problems, vertical angles

Mark the diagram and state your answer as a fraction

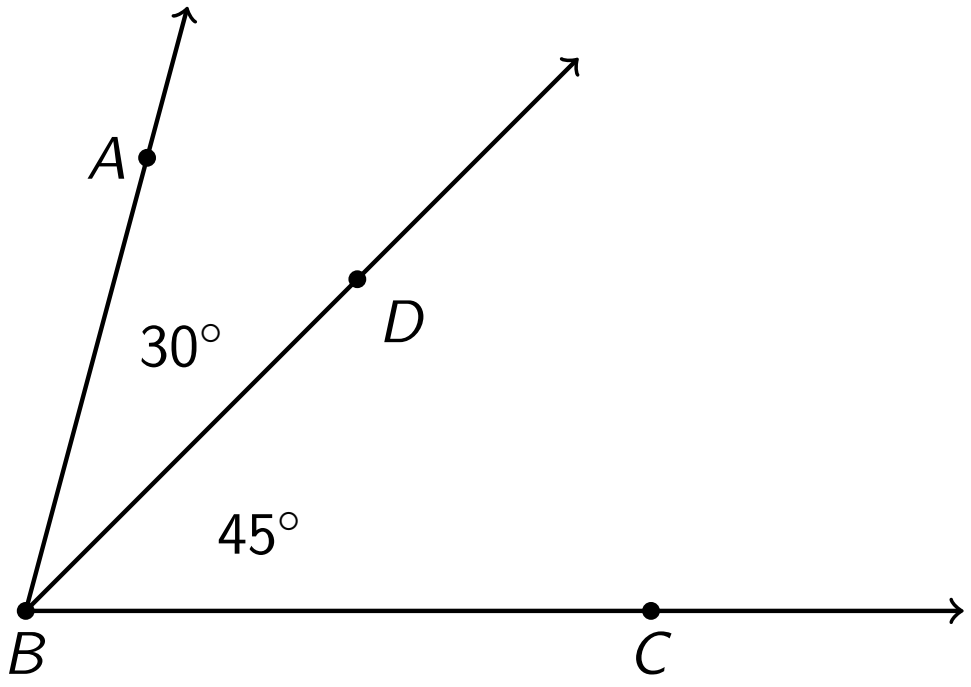
Given $\overline{RST}$, $RS = 3\frac{2}{3}$, and $RT = 9\frac{1}{3}$. Find ST.



Learning Target: I can solve for angle measures

CCSS: HSG.CO.A.1 Know precise geometric definitions 1.9 Monday 27 Sept

Do Now: $m\angle ABD = 30°$, $m\angle DBC = 45°$. Find $m\angle ABC$.



Lesson: Angle addition problems, vertical angles

Learning Target: I can solve for angle measures

CCSS: HSG.CO.A.1 Know precise geometric definitions 1.10 Tuesday 28 Sept

Do Now: Given M bisects $\overline{PQ}$, $PM = x + 7$, $PQ = 23$.

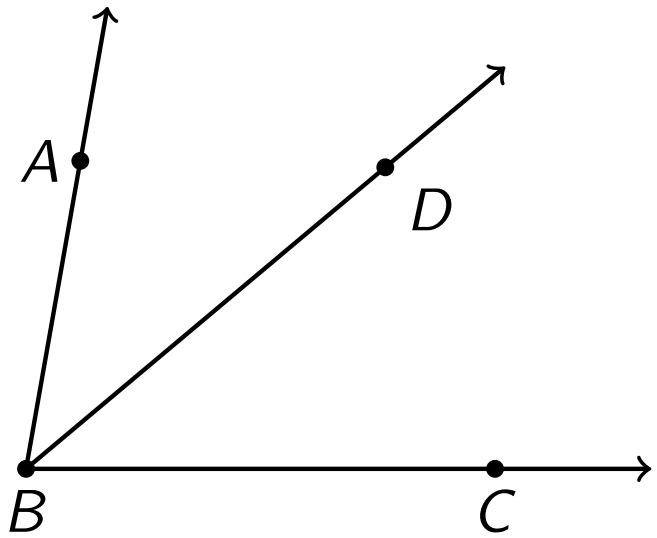
1. Mark the diagram with the values and tick marks
2. Write an equation and solve for x
3. Check your result

Lesson: Angle bisectors

Definition of angle bisector

Angle bisector: a ray dividing an angle into two congruent angles.

As shown, $\overrightarrow{BD}$ bisects $\angle ABC$ if and only if $\angle ABD \cong \angle CBD$.



Learning Target: I can solve for angle measures

CCSS: HSG.CO.A.1 Know precise geometric definitions 1.11 Wednesday 29 Sept

Do Now: Answer the questions then work the length calculation problems

1. I have my own calculator with me today. Yes No
2. I have a notebook, ruler, and protractor. Yes No

PreTest: Angle problems, "Do Now Solve!" Test Friday

Learning Target: I can solve for angle measures

CCSS: HSG.CO.A.1 Know precise geometric definitions 1.12 Thursday 30 Sept

Do Now: Continue with angles review packet

1. I have my own calculator with me today. Yes No
2. I have a notebook, ruler, and protractor. Yes No

PreTest: Angle problems, "Do Now Solve!" Test tomorrow

Open Middle problem (fun)

Use digits from 0 to 9. Using a digit no more than once.

The first two angle measures are complementary. The second two angles supplementary. (degrees)