Module 1
Similarity

What this module is about

This module is about ratio, proportion, and the Basic Proportionality Theorem and its Converse. In this module, you will learn the meanings of ratio and proportion. And as you go over the exercises, you will develop skills that you will need to solve problems especially on triangles in the next module.

What you are expected to learn

This module is designed for you to:

1. apply the fundamental law of proportions
   - product of the means is equal to the product of the extremes.
2. apply the definition of proportion of segments to find unknown lengths.
3. illustrate and verify the Basic Proportionality Theorem and its Converse.

How much do you know

1. Express each ratio in simplest form.

   a. $\frac{12}{18}$ b. $\frac{8}{12}$

2. Find the value of x in each proportion.

   a. $\frac{2}{x} = \frac{3}{6}$ b. 4:8 = 8:x

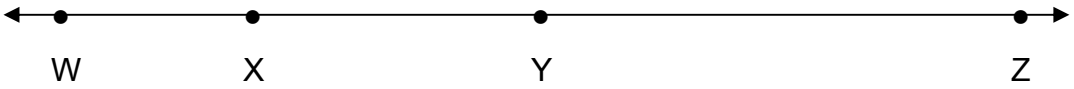
3. State the means and the extremes in each proportion.

   a. 3:6 = 6:12 b. 3:4 = 6: 8

4. Write each ratio as a fraction in simplest form.

   a. 6 to 30 b. 16 to 48

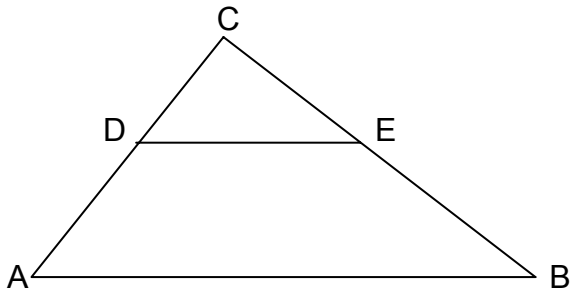
5. In the figure, points W, X, Y, and Z are collinear. WX = 4, XY = 6 , YZ = 10



Give each ratio in simplest form

a. $\frac{wx}{xy}$ b. WX to (XY + YZ)

6. In Δ ABC, CD = 2, AD = 4, CE = 3, EB = 5

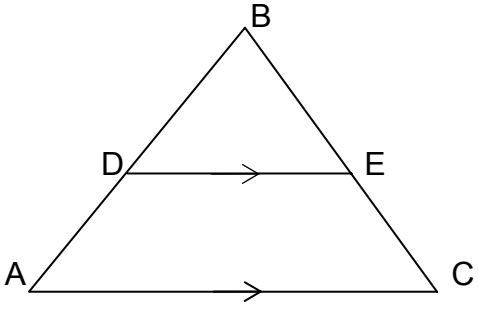


Find the ratio:

a. CE to BC b. CD to CA

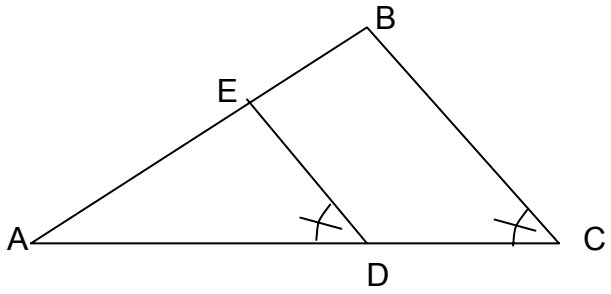
7. Two consecutive angles of a parallelogram are in the ratio 1:2.
   a. What is the measure of the smaller angle?
   b. What is the measure of the larger angle?

8. In ΔABC, DE //AC



   a. Given that BD = 4, DA = 6 and BE = 5, find EC.
   b. Given that BE = 4, EC = 5 and BD = 2, find DA.

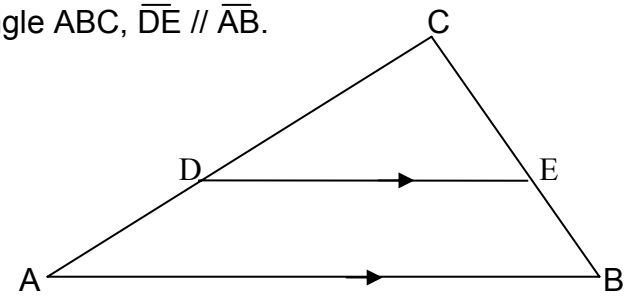
9. In the figure ∠ADE ≅ ∠C



a. If AE = 2, AB = 8, AD = 3, what is AC?

b. If AD = 4, AC = 6, AE = 3, find AB.

10. In triangle ABC, $\overline{DE}$ // $\overline{AB}$.



If DC = 6, DA = 8, CE = 2x, EB = 2x + 4

a. What is x?

b. What is CB?

What you will do

Lesson 1

Ratio and Proportion

A ratio is a comparison of two numbers. The ratio of two numbers *a* and *b* where *b* is not equal to zero can be written in three ways: *a :b*, *a/b* and *a* to *b*.

A proportion is a statement of equality between two ratios. In the proportion a: b = c:d or $\frac{a}{b} = \frac{c}{d}$, a, b, c, and d are called the terms of the proportion. In a proportion, the product of the extremes is equal to the product

of the means. In the proportion a: b = c:d , the extremes are a and d and the means are b and c, hence, ad = bc

Example 1

Express the ratio $\frac{12}{16}$ in simplest form.

Solution:

Divide the numerator and the denominator by their GCF (Greatest Common Factor), 4 .

$$\frac{12 \div 4}{16 \div 4} = \frac{3}{4}$$

The ratio in simplest form is $\frac{3}{4}$ or 3:4.

Example 2

Find the ratio and express your answer in simplest form.
6 hours to 3 days

Solution:

Step 1. Convert 3 days to hours
3 x 24 = 72 (Since there are 24 hours in one day)

Step 2. Write the ratio in terms of hours
6 hours to 72 hours

$$\frac{6\,hours}{72\,hours} = \frac{1}{12}$$

Another solution:

Step 1. Convert 6 hours to days

$$6 \div 24 = \frac{6}{24}$$

$$= \frac{1}{2} \text{ (Since there are 24 hours in one day)}$$

This may be done as follows:

$$6 \text{ hours x } \frac{1\,day}{24\,hours} = \frac{1}{4} \text{ of a day}$$

Step 2. Write the ratio in terms of days

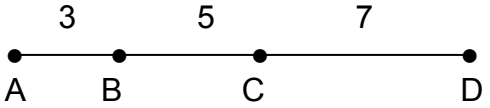
$$\frac{\frac{1}{4} of\ a\ day}{3\,days} = \frac{1}{4} \div 3$$

$$= \frac{1}{4} \times \frac{1}{3}$$

$$= \frac{1}{12}$$

Example 3

a. What is AB:BC?
b. What is (AB + BC) CD



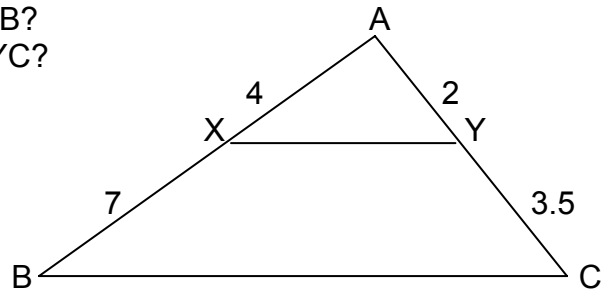
Solution:

a. AB = 3
   BC = 5
   Hence AB :BC = 3:5

b. AB = 3
   BC = 5
   CD = 7
   Hence (AB + BC) : CD = (3 + 5): 7
   = 8:7

Example 4

1. a. What is AX:AB?
   b. What is AY :YC?



Solution

a. AX = 4
   AB = AX + X B
   = 4 + 7
   = 11

   Hence AX : AB = 4:11

b. AY = 2
YC = 3.5

Hence AY:YC = 2:3.5

3.5 can be written as $3\frac{5}{10}$ or $3\frac{1}{2}$ or $\frac{7}{2}$.

Therefore, $\frac{AY}{YC} = \frac{2}{\frac{7}{2}}$

But $\frac{2}{\frac{7}{2}}$ can be written as $2 \div \frac{7}{2}$ which is equal to $2 \times \frac{7}{2}$ or $\frac{4}{7}$

Hence $\frac{AY}{YC} = \frac{4}{7}$ or AY:YC = 4:7

Example 5

State the means and the extremes in the following statement.

3:7 = 6:14

Solution:

The means are 7 and 6 and the extremes are 3 and 14.

Example 6

Determine whether each pair of ratios forms a proportion.

a. $\frac{4}{5}, \frac{6}{8}$

b. $\frac{4}{7}, \frac{8}{14}$

Solution:

a. A proportion is an equality of two ratios

$\frac{4}{5} = \frac{6}{8}$

4:5 = 6:8

The product of the means is equal to the product of the extremes

5(6) =4(8)
30 = 32 This is a false statement

Hence the two ratios do not form a proportion.

b. A proportion is an equality of two ratios

c.

$$\frac{4}{7} = \frac{8}{14}$$

4:7 = 8:14

The product of the means is equal to the product of the extremes

7(8) = 4(14)
56 = 56 This is a true statement

Hence the two ratios form a proportion.

Example 7

Find the value of x.

$$\frac{3}{10} = \frac{x}{30}$$

Solution:

Step 1. Rewrite in the ratio
3:10 = x:30

Step 2. Find the products of the means and the extremes. Then solve for x. Remember, the product of the means is equal to the product of the extremes.

10(x) = 3(30)
10x = 90
x = 9

Example 8

The measures of two complementary angles are in the ratio 1:2. Find the measure of each angle.

Solution:

Representation:

Let x = the measure one angle
90 –x = the measure of its complement

Proportion:

$$\frac{x}{90-x} = \frac{1}{2}$$

x : (90-x) = 1:2

1(90 –x) = 2(x)

90-x = 2x

-x –2x = - 90

-3x = - 90

x = 30 measure of one angle

90 – x = 60 measure of its complement

Example 9

The measure of two supplementary angles are in the ratio 2:3. Find the measure of each angle.

Solution:

Representation:

Let x = the measure of one angle
180 – x = the measure of its supplement

Proportion:

$$\frac{x}{180-x} = \frac{2}{3}$$

x:(180-x) = 2:3

2(180-x) = 3(x)

360 – 2x = 3x

-2x –3x = -360

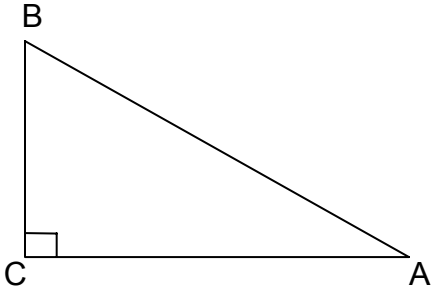
$-5x = -360$

$x = 72$ the measure of one angle

$180 - x = 108$ the measure of its supplement

Example 10

In ΔABC below, $m\angle C = 90$. The measures of $\angle A$ and $\angle B$ are in the ratio 4:5. Find the measures of $\angle A$ and $\angle B$.



Solution:

Representation:

Let x = measure of $\angle A$

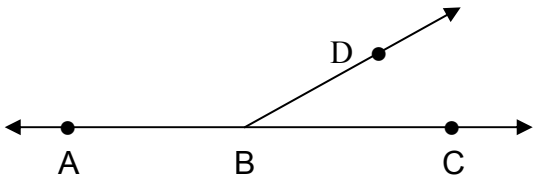
$90-x$ = measure of $\angle B$ (Because, $\angle A$ and $\angle B$ are acute angles)

Proportion:

$x:90-x = 4:5$
$4(90-x) = 5x$
$360-4x = 5x$
$-4x - 5x = -360$
$-9x = -360$
$x = 40$ measure of $\angle A$
$90-x = 50$ measure of $\angle B$

Example 11

In the figure, $\angle ABD$ and $\angle CBD$ form a linear pair. If the measures of $\angle ABD$ and $\angle CBD$ are in the ratio 7 to 3, what is the measure of $\angle CBD$?



Solution:

Let x be the measure of ∠CBD.
180-x be the measure of ∠ABD

[Remember that if two angles form a linear pair they are supplementary]

Proportion:

$$\frac{m\angle ABD}{m\angle CBD} = \frac{7}{3}$$

Substitute 180-x for m ∠ ABD and x for m ∠ CBD

$$\frac{180-x}{x} = \frac{7}{3}$$

(180-x):x = 7:3

7x = 3(180-x)

7x = 540 – 3x

7x + 3x = 540

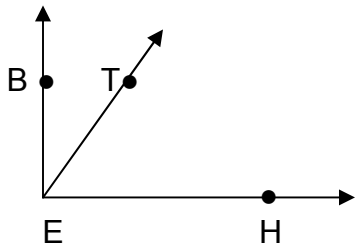
10 x = 540

x = 54 measure of ∠CBD.

180 – x = 126 measure of ∠ABD.

Example 12

In the figure, $\overrightarrow{EB} \perp \overrightarrow{EH}$ and $\overrightarrow{ET}$ is in the interior of ∠ BEH. If the measures of ∠BET and ∠HET are in the ratio 1:5, what is the measure of ∠HET?



Solution:

Let x = measure of ∠ BET
90-x = measure of ∠ HET
[Remember that perpendicular rays form a right angle and the measure of a right angle is 90.]

Proportion:

$$\frac{m\angle BET}{m\angle HET} = \frac{1}{5}$$

Substitute x for m∠BET and 90-x for m∠HET

$$\frac{x}{90-x} = \frac{1}{5}$$

x : (90-x) =1:5

5x = 1(90 – x)

5x = 90 – x

5x + x = 90

x = 15 measure of ∠BET

90-x = 75 measure of ∠HET

Try this out

Set A

Find the ratio of each of the following. Use the colon and write your answers in simplest form.

1. 14 cm to 28 cm
2. 8 hours to 12 hours
3. 16 days to 36 days
4. 42 dm to 63 dm
5. 12 inches to 36 inches
6. 24 feet to 36 feet
7. 12 inches to 24 inches
8. 6 inches to 2 feet
9. 3 feet to 24 inches
10. 8 hours to 1 day
11. 14 days to 2 weeks
12. 3 weeks to 24 days
13. 5 minutes to 60 seconds
14. 5 centimeters to 2 decimeters
15. 4 months to 1 year
16. 3 feet to 12 inches
17. 3 hours to 72 minutes
18. 2 weeks to 8 days
19. 2 centuries to 300 years
20. 200 years to 3 centuries

Set B.

Find the missing number

1. $\frac{2}{4} = \frac{n}{10}$

2. $\frac{n}{6} = \frac{2}{3}$

3. $\frac{3}{n} = \frac{5}{10}$

4. $\frac{6}{10} = \frac{3}{n}$

5. $\frac{n}{7} = \frac{2}{5}$

6. $\frac{4}{8} = \frac{n}{7}$

7. $\frac{7}{n} = \frac{5}{2.5}$

8. $\frac{3}{3.6} = \frac{4}{n}$

9. $\frac{2n}{3} = \frac{5}{2}$

10. $\frac{6}{5} = \frac{3n}{4}$

11. $\frac{3n}{7} = \frac{6}{14}$

12. $\frac{4}{5n} = \frac{2}{10}$

13. $\frac{3}{2} = \frac{n}{7}$

14. $\frac{3n}{5} = \frac{3}{2}$

15. $\frac{8}{5} = \frac{2}{n}$

16. $\frac{6n}{8} = \frac{9}{2}$

17. $\frac{5n}{9} = \frac{6}{4}$

18. $\frac{5}{4} = \frac{12}{n}$

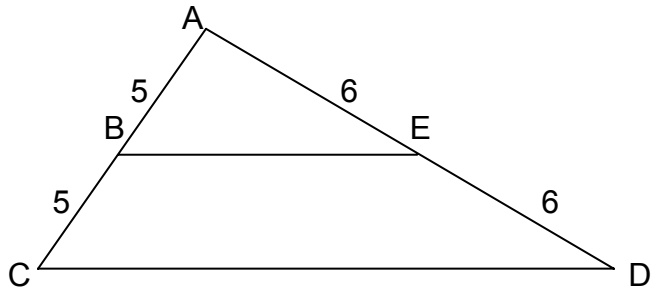
19. $\frac{15}{3} = \frac{n}{4}$

20. $\frac{6}{n} = \frac{2}{5}$

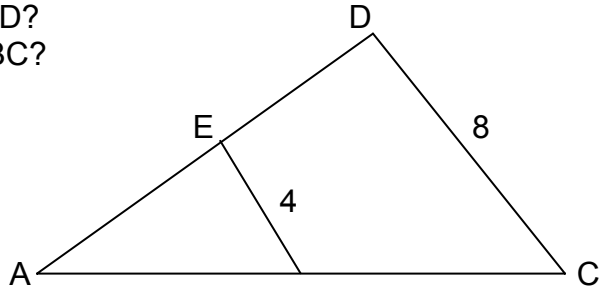
Set C

1. The measures of two supplementary angles are in the ratio 1:2. Find the measure of each angle.
2. The measures of two supplementary angles are in the ratio 1: 4. Find the measure of each angle
3. The measures of two complementary angles are in the ratio 2:3. Find the measure of each angle.
4. The measures of two complementary angles are in the ratio 3:7. Find the measure of each angle.

5. a. What is the ratio of AB to AC?
   b. What is AE:ED?

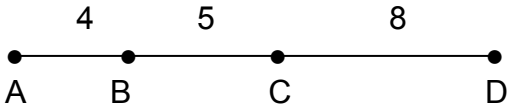


6. a. What is BE:CD?
   b. What is AB :BC?

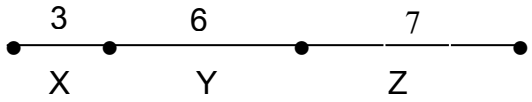


3 B 5

7. a. What is AB:BC?
   b. What is AB: (BC + CD)



8. a. What is $\frac{x}{y}$
   b. What is $\frac{x + y}{y + z}$



Determine whether each pair of ratios forms a proportion.

9. $\frac{6}{7}, \frac{7}{8}$

10. $\frac{8}{9}, \frac{16}{18}$

11. $\frac{6}{9}, \frac{18}{27}$

12. $\frac{7}{6}, \frac{42}{36}$

13. $\frac{11}{12}, \frac{22}{24}$

14. $\frac{13}{9}, \frac{7}{6}$

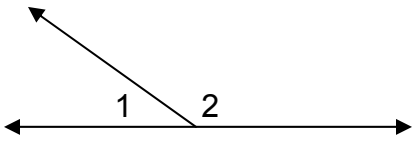
15. $\frac{22}{11}, \frac{4}{2}$

16. $\frac{14}{7}, \frac{12}{6}$

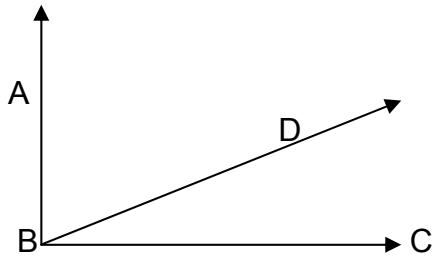
17. The acute angles in a right triangle are in the ratio 3: 6. Find the measure of the larger of the two angles.

18. The acute angles in a right triangle are in the ratio 2 to seven. What is the measure of the smaller of the two angles.

19. In the figure at the right, $\angle 1$ and $\angle 2$ form a linear pair. If the measures of $\angle 1$ and $\angle 2$ are in the ratio 2 to 8. Find the measures $\angle 1$ and $\angle 2$.



20. In the figure below, $\overrightarrow{BA} \perp \overrightarrow{BC}$. $\overrightarrow{BD}$ is in the interior of $\angle ABC$. If the measures of $\angle ABD$ and $\angle CBD$ are in the ratio 7 to 2. Find the measure of $\angle ABD$.

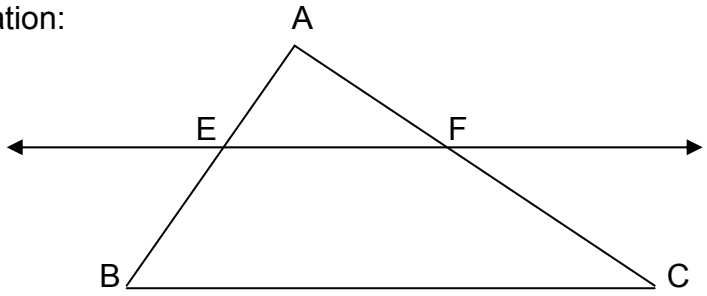


Lesson 2

The Basic Proportionality Theorem and Its Converse

The Basic Proportionality Theorem: If a line is parallel to one side of a triangle and intersects the other two sides in distinct points, then it divides the two sides proportionally.

Illustration:



In the figure, if $\overleftrightarrow{EF}$ is parallel to $\overline{BC}$ and intersects $\overline{AB}$ and $\overline{AC}$ at points E and F respectively, then

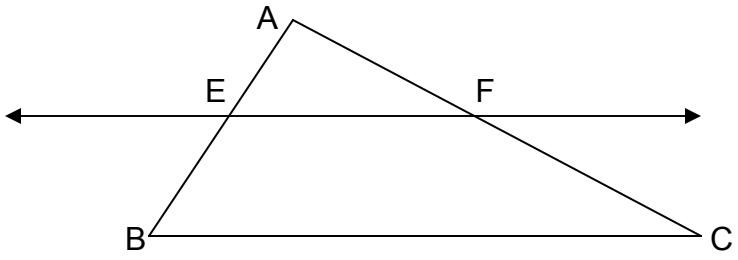
a. $\frac{AE}{EB} = \frac{AF}{FC}$

b. $\frac{AE}{AB} = \frac{AF}{AC}$

c. $\frac{EB}{AB} = \frac{FC}{AC}$

The Converse of the Proportionality Theorem: If a line divides the two sides of a triangle proportionally, then the line is parallel to the third line.

Illustration:

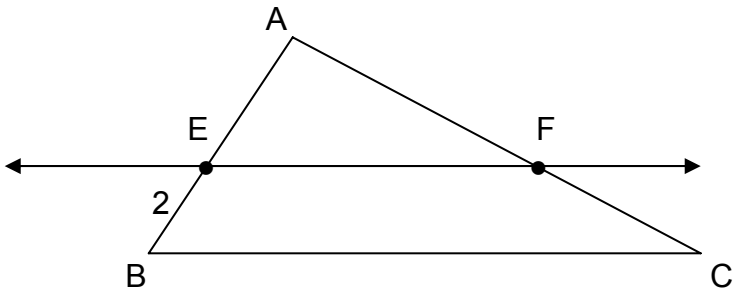


If in $\triangle ABC$, $\frac{AE}{EB} = \frac{AF}{FC}$, then $\overleftrightarrow{EF} \parallel \overline{BC}$.

You can verify the Basic Proportionality Theorem by doing the following activity. In this activity you need a ruler, a pencil and a protractor.

1. Draw $\triangle ABC$ such AB = 5 cm and AC = 10 cm.
2. Draw point E on side $\overline{AB}$ such that it is 2 cm away from vertex B.
3. Draw a line parallel to $\overline{BC}$ passing thru point E intersecting $\overline{AC}$ at point F.

Illustration:



4. Verify whether line $\overleftrightarrow{EF}$ is really parallel to $\overline{BC}$ by measuring $\angle AEF$ and $\angle ABC$. Recall: If two lines are cut by a transversal and a pair of corresponding angles are congruent, then the lines are parallel.

5. Find the lengths of $\overline{AE}$, $\overline{AF}$ and $\overline{FC}$.

6. Is $\frac{AE}{EB} = \frac{AF}{FC}$?

   Is $\frac{AE}{AB} = \frac{AF}{AC}$?

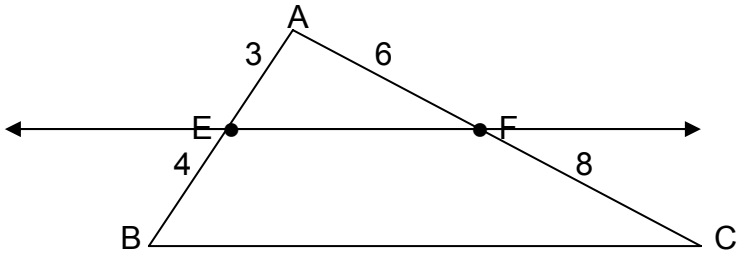
   Is $\frac{EB}{AB} = \frac{FC}{AC}$?

You can verify the Converse of the Basic Proportionality Theorem by doing the following activity.

1. Draw ΔABC such that $\overline{AB}$ = 7 cm and AC = 14 cm.
2. Draw point E on side $\overline{AB}$ such that it is 3 cm away from vertex A. What is the length of $\overline{EB}$?
3. Draw point F on side AC such that it is 6 cm away from vertex A. What is the length of $\overline{FC}$?
4. Draw a line passing through points E and F. Notice that line $\overleftrightarrow{EF}$ divides sides $\overline{AB}$ ad $\overline{AC}$ proportionally.

$$\frac{3}{4} = \frac{6}{8}$$

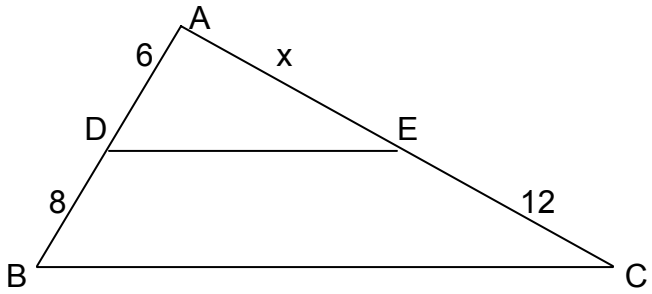
Illustration:



5. What can you say about line $\overleftrightarrow{EF}$? Is it parallel to $\overline{BC}$? Verify by measuring $\angle AEF$ and $\angle ABC$.

Example 1

In ΔABC, DE // BC. If AD = 6, DB = 8 and EC = 12, find AE.



Solution:

Let x = AE

$\frac{x}{12} = \frac{6}{8}$

$\frac{x}{12} = \frac{3}{4}$

x:12 = 3:4

12(3) = 4(x)

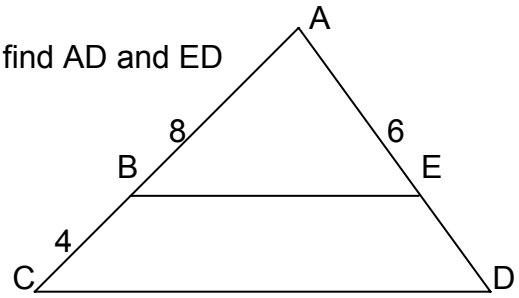
4x = 12(3) (by Symmetric Property of Equality)

$4x = 36$

$x = 9$

Example 2

In ΔACD, $\overline{BE} \parallel \overline{CD}$ If AB = 8, BC = 4, AE = 6, find AD and ED



Solution:

Let x = AD

$\frac{AB}{AC} = \frac{AE}{AD}$

$\frac{8}{8+4} = \frac{6}{x}$

$8:12 = 6:x$

$12(6) = 8(x)$

$8x = 72$

$x = 9$

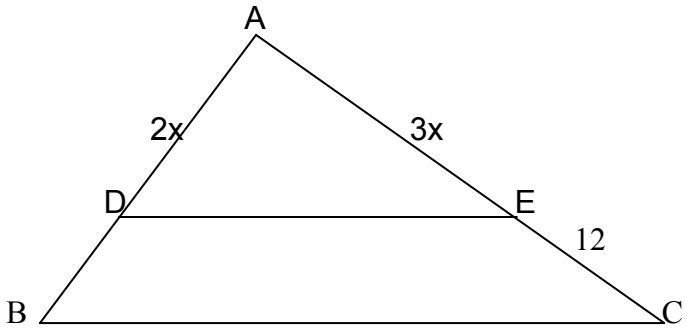
$AD = 9$

Hence: $ED = AD - AE$

$= x - 6$

$= 3$

Example 3



In ΔABC, $\overline{DE} \parallel \overline{BC}$, AD =2x, AB = 20, AE = 3x and EC = 12. Find AD

Solution:

Step 1. $\frac{AD}{AB} = \frac{AE}{AC}$

$$\frac{2x}{20} = \frac{3x}{3x+12}$$

$$\frac{x}{10} = \frac{3x}{3x+12}$$

$x(3x + 12) = 10(3x)$
$3x^2 + 12x = 30x$
$3x^2 + 12x – 30x = 0$
$3x^2 – 18x = 0$
$3x(x – 6) = 0$ by factoring

$3x = 0$ | $x – 6 = 0$ Equating both factors to 0.
$x = 0$ | $x = 6$

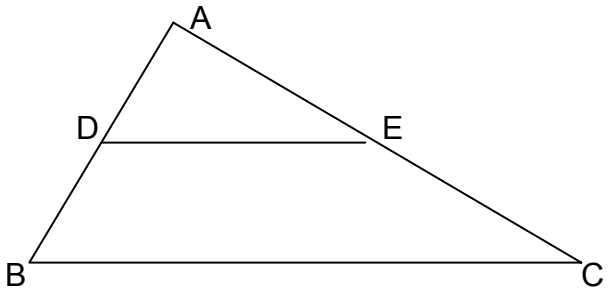
Step 2. Substitute 6 for x in 2x
$2x = 2(6)$
$= 12$

Hence AD = 12

Try this out

Set A

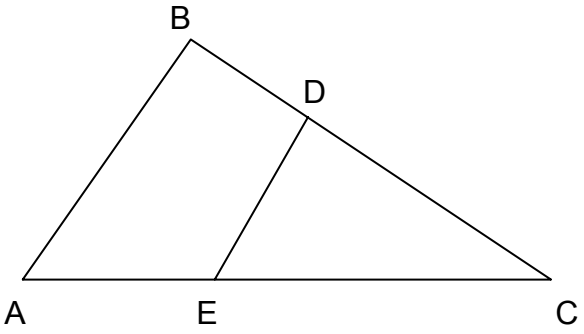
In the figure, $\overline{DE}$ // $\overline{BC}$.



True or False

1. $\frac{AD}{DB} = \frac{AE}{EC}$
2. $\frac{AD}{AB} = \frac{AE}{AC}$
3. $\frac{AD}{DB} = \frac{EC}{AE}$
4. $\frac{AD}{AB} = \frac{AC}{AE}$
5. $\frac{DB}{AB} = \frac{EC}{AC}$
6. $\frac{BD}{AD} = \frac{AE}{EC}$
7. $\frac{DB}{EC} = \frac{AB}{AC}$
8. $\frac{AE}{AD} = \frac{EC}{DB}$
9. $\frac{AD}{EC} = \frac{AE}{DB}$
10. $\frac{AD}{AE} = \frac{DB}{EC}$

In the figure, $\overline{AB} \parallel \overline{ED}$.



11. $\frac{CD}{BD} = \frac{CA}{AE}$

12. $\frac{BC}{CD} = \frac{AC}{AE}$

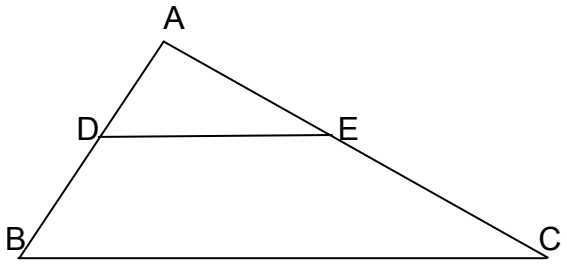
13. $\frac{AE}{EC} = \frac{BC}{BD}$

14. $\frac{AE}{AC} = \frac{CD}{BD}$

15. $\frac{CD}{AB} = \frac{CB}{AC}$

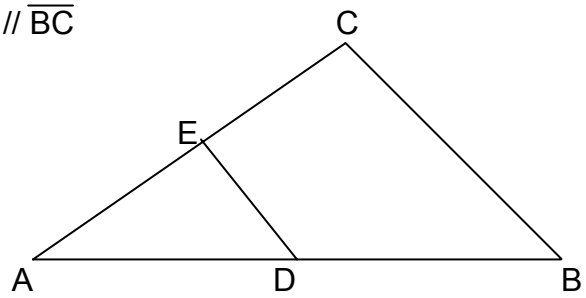
Set B

In $\triangle ABC$, $\overline{DE} \parallel \overline{BC}$.



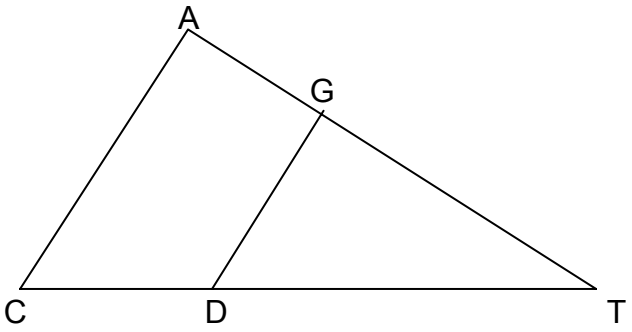
1 If AD = 1, DB = 2, and EC = 4, find AE.
2. If AD = 2, DB = 4, and AE = 1, find EC.
3. If BD = 6, AD = 4, and AE = 5, find EC.
4. If BD = 5, AD = 6, and CE = 9. what is AE?
5. If AD = 2, AB = 8, and AC = 10 what is AE?

In $\triangle$ ABC, $\overline{DE} \parallel \overline{BC}$



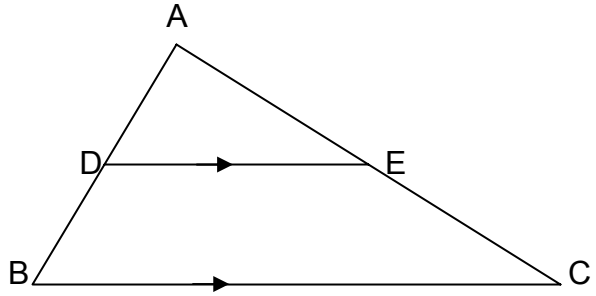
6. If AD = 4, AB = 12 and AC = 15, what is AE?
7. If AD = 6, DB = 2 and AC = 10 what is AE?
8. If AB = 12, AE = 4 and EC = 6, what is AD?
9. If AD = 2.5, DB = 4 and EC = 6, find AE.
10. If DB = 5, AE = 3.5 and EC = 7, what is AD?

In ΔCAT, $\overline{AC} \parallel \overline{GD}$.



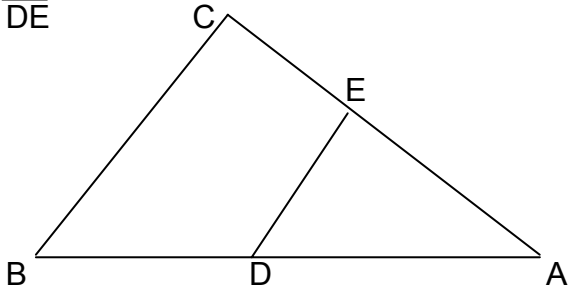
11. If CD = 10, DT = 12, AG = 8, what is GT?
12. If CT = 10, CD = 4, AT = 7, what is AG?
13. If AG = 3, TG = 6, DT = 8, what is CD?
14. If AG = 4, GT = 12, CD = 6, what is DT?
15. If AT = 12, AG = 6, CT = 16, what is CD?

Set C



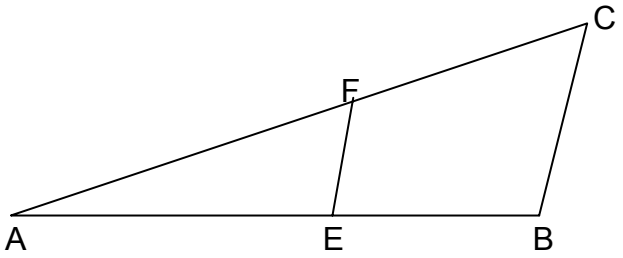
1. If AD = x + 1, DB = 2, AE = 10 and EC = 5, what is x?
2. If AD = x + 2, DB = 4, AE = 6 and EC =8, what is x?
3. If AD = 4, DB = 6, AE = x + 3 and EC = 7.5, what is x?
4. If AD = 2, DB = 6, AE = x + 2 and EC = 9, find x
5. If AD = 5, DB = x + 2, AE = 4 and EC = 4.8, what is x?

In Δ BAC, $\overline{BC} \parallel \overline{DE}$



6. If AD = 6, AE = 9, and AC = 21, what is BD?
7. If AD = 4, BD = 5 and AE = 6, what is EC?
8. If DB = 6, AE = 6 and EC = 9 what is AD?
9. If AD = x, AB = 5, AE = 2x and EC = 4, what is AD?
10. If AD = x, AB = 5, AE = 2x and EC = 6, what is AD?

In $\triangle ABC$, $\overline{EF} // \overline{BC}$.



11. If AE = x, EB = x + 10, AF = 4 and FC = 6, what is x?
12. If AE = 6, EB = 8, AF = y and FC = 2y –2, what is y?
13. If AE = 5, AB = x +2, AF = 10 and AC = 3x, what is x?
14. If AE = x + 4, EB = 12, AF = x + 5 and FC = 14, what is x?
15. If AE = 6, EB = 4y –1, AF = 2 and FC = 3, what is y?

Let's summarize

1. A ratio is a quotient of two numbers .
2. A proportion is an equality of two ratios.
3. The Basic Proportionality Theorem:
   If a line is parallel to one side of a triangle and intersects the other two sides in distinct points, then it divides the two sides proportionally.

4. The Converse of the Basic Proportionality Theorem:
   If a line divides the two sides of a triangle proportionally, then the line is parallel to the third side

What have you learned

1. The value of n in 4:5 = n:20 is
   A. 14 C. 16
   B. 15 D. 17

2. The value of x in $\frac{2x}{6} = \frac{3}{2}$
   A. 3.5 C. 5.5

B. 4.5 D. 6.5

3. Write the ratio $\frac{18}{30}$ as a fraction in lowest terms

A. $\frac{9}{16}$ C. $\frac{3}{5}$

B. $\frac{15}{9}$ D. $\frac{5}{3}$

4. Which of the following proportions is true?

A. 2: 3 = 4:5 C. 4: 8 = 2: 4

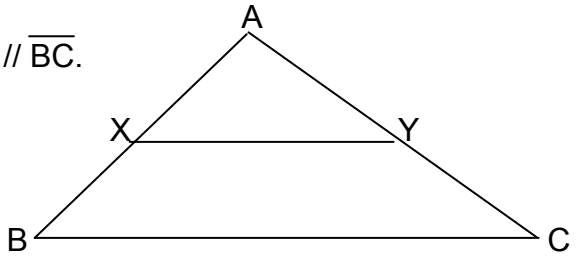
B. 5:7 = 3: 2 D. 4 :7 = 7: 4

5. Two consecutive angles of a parallelogram are in the ratio 2:3. What is the measure of the smaller angle?

A. 36 C. 108

B. 72 D. 90

6. In Δ ABC, $\overline{XY}$ // $\overline{BC}$.

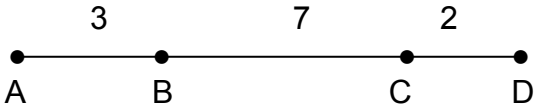


Given that AX = 5, XB = 6, and AY = 8, what is YC?

A. 9 C. 7.6

B. 7 D. 9.6

7. In the figure below, What is AB:(BC + CD)?



A. $\frac{3}{7}$ C. $\frac{3}{14}$

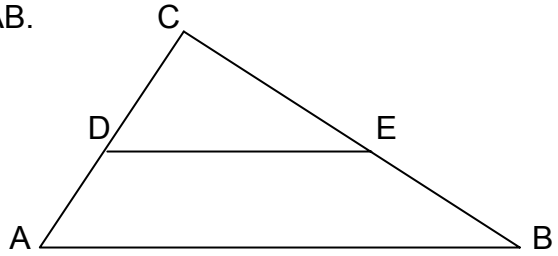
B. $\frac{10}{9}$ D. $\frac{1}{3}$

8. Which of the following pairs of ratios forms a proportion?

A. $\frac{3}{5}, \frac{5}{9}$ C. $\frac{6}{7}, \frac{8}{9}$

B. $\frac{5}{7}, \frac{10}{14},$ D. $\frac{5}{6}, \frac{6}{5}$

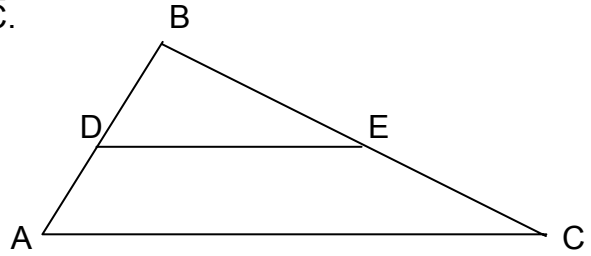
9. In Δ ABC, DE // AB.



If DC = x, AD = 4, CE = x + 1 and EB = 8, what is x?

A. 4 C. 2
B. 3 D. 1

10. In the figure, $\overline{DE}$ // $\overline{AC}$.



If BE =2, BC = 6 and BD = 3, what is BA?

A. 8 C. 5
B. 9 D. 12

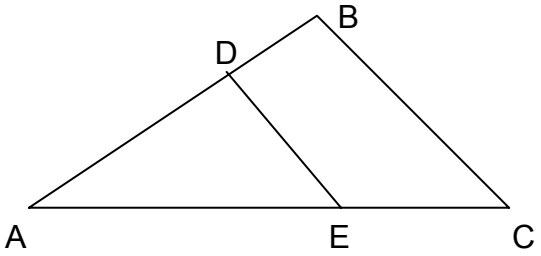
11. Write the ratio 2 hours : 1 day as a fraction in lowest terms

A. 2:1 C. 1:12
B. 1:2 D. 12:1

12. Which of the following proportions is false?

A. 2:7 =8:28 C. 4:7 = 8:14
B. 3:5 = 9:15 D. 5:6 = 15:24

13. In ΔABC, $\overline{DE}$ // $\overline{BC}$. Which of the following proportions is false?



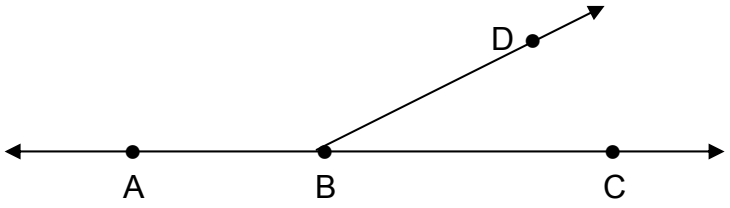
A. $\frac{AD}{DB} = \frac{AE}{EC}$

B. $\frac{AB}{AD} = \frac{AC}{AE}$

C. $\frac{EC}{AC} = \frac{DB}{AB}$

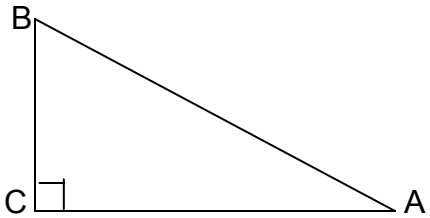
D. $\frac{AD}{AB} = \frac{EC}{AC}$

14. in the figure. Points A, B, and C are collinear. The ratio of ∠ABD to ∠CBD is 5:1 . What is m∠CBD?



A. 150
B. 30
C. 50
D. 100

15. ∆ ABC is a right triangle. If the ratio of ∠A to ∠B is 2:3, what is m∠ B?



A. 18
B. 27
C. 20
D. 36

Answer Key

How much do you know

1. a. $\frac{2}{3}$
   b. $\frac{2}{3}$

2. a. x = 4
   b. x = 16

3. The means are 6 and 6
   The extremes are 3 and 12

4. a. $\frac{1}{5}$
   b. $\frac{1}{3}$

5. a. $\frac{2}{3}$
   b. $\frac{1}{4}$

6. a. $\frac{3}{8}$
   b. $\frac{1}{3}$

7. a. 60
   b. 120

8. a. 7.5
   b. 2.5

9. a. AC = 12
   b. AB = 4.5

10. a. x = 4
    b. CB = 28

Try this out

Lesson 1

Set A

1. 1:2
2. 2:3
3. 4:9
4. 2:3
5. 1:3
6. 2:3
7. 1:2
8. 1:4
9. 3:2
10. 1:3
11. 1:1
12. 7:8
13. 5:1
14. 1:4
15. 1:3
16. 3:1
17. 5:2
18. 7:4
19. 2:3
20. 2:3

Set B

1. n = 5
2. n = 4
3. n = 6
4. n = 5
5. n = 2.8
6. n = 3.5
7. n = 3.5
8. n = 4.8
9. n = 3.75
10. n = 1.6
11. n = 1
12. n = 4
13. n = 10.5
14. n = 2.5
15. n = 1.25
16. n = n = 6
17. n = 2.7
18. n = 9.6
19. n = 20
20. n = 40

Set C

1. 60 and 120
2. 36 and 144
3. 36 and 54
4. 27 and 63
5. a.1:2
   b. 1:1
6. a. 1:2
   b. 3:5
7. a. 4:5
   b. 4:13
8. a. 1:2
   b. 9:13
9. No
10. Yes
11. Yes
12. Yes
13. Yes
14. No
15. Yes
16. Yes
17. 60

Lesson 2

Set A

1. True
2. True
3. False
4. False
5. True
6. False
7. True
8. True
9. False
10. True
11. False
12. False
13. False
14. False
15. False

Set B

1. 2
2. 2
3. 7.5
4. 10.8
5. 2.5
6. 5
7. 7.5
8. 4.8
9. 3.75
10. 2.5
11. 9.6
12. 2.8
13. 4
14. 18
15. 8

Set C

1. 3
2. 1
3. 2
4. 1
5. 4
6. 8
7. 7.5
8. 4
9. 3
10. 2
11. 20
12. 3
13. 4
14. 2
15. 2.5

What have you learned

1. C
2. B
3. C
4. C
5. B
6. D
7. D
8. B
9. D
10. B
11. C
12. D
13. D
14. B
15. D