

CONCEPTS AND PROCEDURES

After studying this chapter, you should be able to

- Recognize and work with ratios (8.1)
- Recognize and work with proportions (8.1)
- Apply the product and ratio theorems (8.1)
- Calculate geometric means (8.1)
- Identify the characteristics of similar figures (8.2)
- Use several methods to prove that triangles are similar (8.3)
- Use the concept of similarity to establish the congruence of angles and the proportionality of segments (8.4)
- Solve shadow problems (8.4)
- Apply three theorems frequently used to establish proportionality (8.5)

- * Test will be tomorrow: Wed 1-27
- * Work on the circled problems while I hand back work. We will go over them shortly.
- * Homework is the rest of the packet. Check the website and check your work.
- * Hand this in tomorrow.

VOCABULARY

arithmetic mean (8.1)
dilation (8.2)
extremes (8.1)
geometric mean (8.1)
mean proportion (8.1)
mean proportional (8.1)
means (8.1)

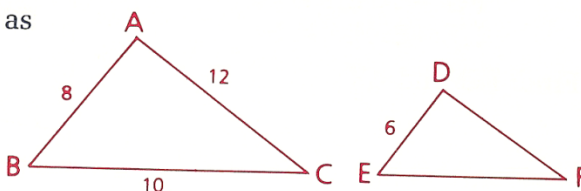
proportion (8.1)
ratio (8.1)
reduction (8.2)
rise (8.1)
run (8.1)
similar (8.2)
similar polygons (8.2)

This is a selection of material covered in chapter 8, but may not be all inclusive. Please review thoroughly, using the above vocab and concepts as a guide, as well as homework and the quiz.

Problem Set A

- 1 Identify the means and the extremes in the proportion $\frac{a}{b} = \frac{c}{d}$.
- 2 Find the fourth proportional to 4, 6, and 8.
- 3 Find the mean proportionals between 5 and 20.
- 4 Find the geometric means between 3 and 6.
- 5 If $9x = 4y$, find the ratio of x to y .

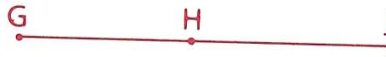
- 6 Given: $\triangle ABC \sim \triangle DEF$, with lengths as shown
Find: DF and EF



- 7 Pentagon ABCDE is similar to pentagon A'B'C'D'E'. The pentagons' respective perimeters are 24 and 30. If $AB = 6$, find $A'B'$.

AMDG

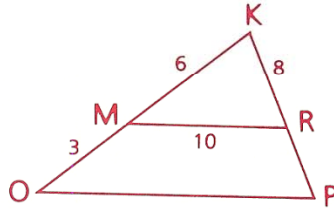
8 If $\frac{GH}{HJ} = \frac{3}{4}$ and $GJ = 56$, find HJ .



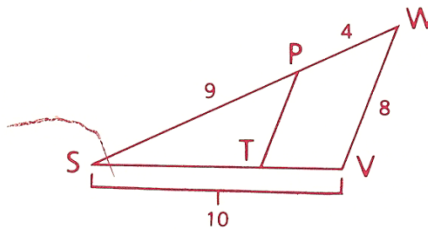
9 If $\frac{r}{3x} = \frac{a}{2b}$, what is the value of x in terms of a , b , and r ?

10 A radio antenna that is 100 m tall casts an 80-m shadow. At the same time, a nearby telephone pole casts a 16-m shadow. Find the height of the telephone pole.

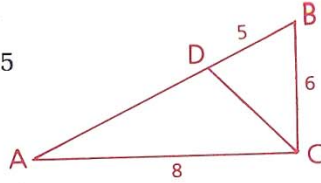
11 Given: $\overleftrightarrow{MR} \parallel \overleftrightarrow{OP}$,
lengths as shown
Find: RP and OP



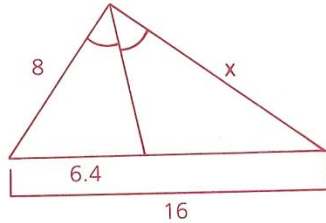
12 Given: $\overleftrightarrow{TP} \parallel \overleftrightarrow{VW}$,
lengths as shown
Find: ST , TV , and PT



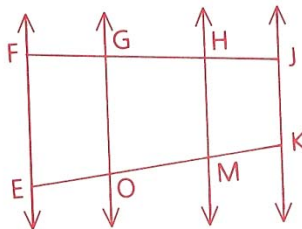
13 Given: \overleftrightarrow{CD} bisects $\angle ACB$.
 $AC = 8$, $BC = 6$, $BD = 5$
Find: AD



14 Given: Diagram as shown
Find: x

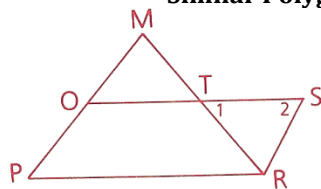


16 Given: $\overleftrightarrow{EF} \parallel \overleftrightarrow{GO} \parallel \overleftrightarrow{HM} \parallel \overleftrightarrow{JK}$,
 $FG = 2$, $GH = 8$,
 $HJ = 5$, $EM = 6$
Find: EO and EK

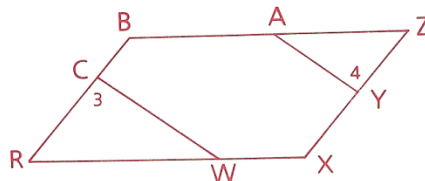


Similar Polygons (ch 8) Review DATE

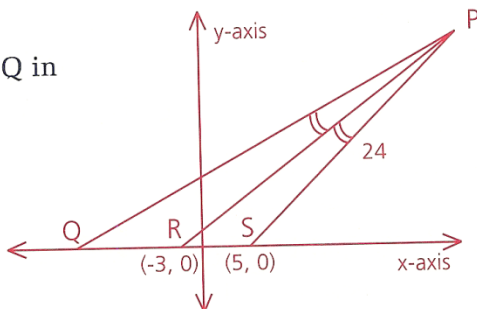
- 17 Given: $\overline{OS} \parallel \overline{PR}$,
 $\angle 1 \cong \angle 2$
Prove: $\frac{MO}{OP} \cong \frac{MT}{SR}$



- 18 Given: BRXZ is a \square .
 $\angle 3 \cong \angle 4$
Prove: $(RC)(ZA) = (ZY)(RW)$



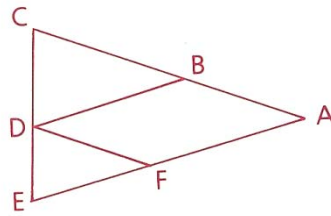
- 19 If $PQ = 30$, find the coordinates of Q in the diagram. $(-13, 0)$



Problem Set B

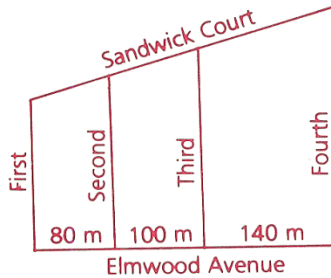
- 20 Indicate whether the statement is true Always, Sometimes, or Never (A, S, or N)
- a Two isosceles triangles are similar if a base angle of one is congruent to a base angle of the other.
 - b Two isosceles triangles are similar if the vertex angle of one is congruent to the vertex angle of the other.
 - c An equilateral triangle is similar to a scalene triangle.
 - d If two sides of one triangle are proportional to two sides of another triangle, the triangles are similar.
 - e In $\triangle ABC$, $\angle A = 40^\circ$, $AB = 6$, and $BC = 8$.
In $\triangle RST$, $RS = 12$, $ST = 16$, and $\angle R = 80^\circ$.
Therefore, $\triangle ABC \sim \triangle RST$.
 - f If a line intersects a side of a triangle at one of its trisection points and is parallel to a second side, then it intersects the third side at one of its trisection points.
 - g Two right triangles are similar if the legs of one are proportional to the legs of the other.
 - h If the ratio of the measures of a pair of corresponding sides of two polygons is 3:4, then the ratio of the polygons' perimeters is 5:6.

- 21 Given: $ABDF$ is a \square .
 Conclusion: $\triangle CBD \sim \triangle DFE$



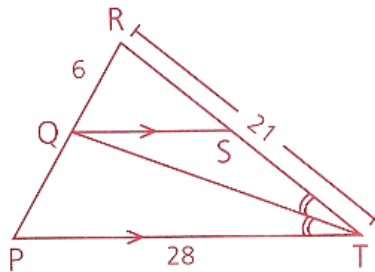
- 26 If $\frac{7}{x + 4y} = \frac{9}{2x - y}$, find the ratio of x to y .

- 28 The diagram shows a part of the town of Oola, La. First, Second, Third, and Fourth streets are each perpendicular to Elmwood Avenue. If the total frontage on Sandwich Court is 400 m, find the length of each block of Sandwich Court.



Problem Set C

- 29 Given: \overrightarrow{TQ} bisects $\angle RTP$.
 $\overleftrightarrow{QS} \parallel \overleftrightarrow{PT}$
 Find: QP , RS , and QS .



Similar Polygons (ch 8) Review DATE

Pages 343-347 Chapter 8 Review Problems

1 b and c are the means, a and d the extremes.

2 $\frac{4}{6} = \frac{8}{x}$ 3 $\frac{5}{x} = \frac{x}{20}$
 $4x = 48$ $x^2 = 100$
 $x = 12$ $x = \pm 10$

4 $\frac{3}{x} = \frac{x}{6}$ 5 $9x = 4y$
 $x^2 = 18$ $x = \frac{4y}{9}$
 $x = \sqrt{18} \approx 4.24$ $\frac{x}{y} = \frac{4}{9}$

6 Since corr sides of ~ Δs are prop,
 $\frac{8}{6} = \frac{10}{EF}$ $\frac{8}{6} = \frac{12}{DF}$
 $8(EF) = 60$ $8(DF) = 72$
 $EF = \frac{60}{8} = \frac{15}{2}$ $DF = 9$

7 $\frac{24}{30} = \frac{6}{x}$ 8 $HJ = 56 - x$
 $\frac{4}{5} = \frac{6}{x}$ $\frac{3}{4} = \frac{x}{56 - x}$
 $(4x) = (30)$ $3(56 - x) = 4x$
 $x = 7\frac{1}{2}$ or $\frac{15}{2}$ $168 - 3x = 4x$
 $A'B' = 7\frac{1}{2}$ or $\frac{15}{2}$ $168 = 7x$
 $24 = x$
 $HJ = 56 - 24 = 32$

9 $2br = 3xa$ 10 $\frac{100}{80} = \frac{x}{16}$
 $\frac{2br}{3a} = x$ $80x = 1600$
 $x = 20$
 pole is 20 m.

11 $\frac{KM}{KR} = \frac{MO}{RP}$ $\frac{KM}{MR} = \frac{KO}{OP}$
 $\frac{6}{8} = \frac{3}{RP}$ $\frac{6}{10} = \frac{9}{OP}$
 $6(RP) = 24$ $6(OP) = 90$
 $RP = 4$ $OP = 15$

12 $\frac{9}{9+4} = \frac{ST}{10}$ $\frac{4}{9+4} = \frac{TV}{10}$ $\frac{9}{PT} = \frac{9+4}{8}$
 $\frac{9}{13} = \frac{ST}{10}$ $\frac{4}{13} = \frac{TV}{10}$ $\frac{9}{PT} = \frac{13}{8}$
 $90 = 13(ST)$ $13(TV) = 40$ $13(PT) = 72$
 $ST = \frac{90}{13}$ $TV = \frac{40}{13}$ $PT = \frac{72}{13}$

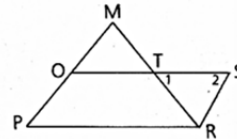
13 $\frac{6}{5} = \frac{8}{AD}$ 14 $\frac{9.6}{6.4} = \frac{x}{8}$
 $6(AD) = 40$ $6.4x = 76.8$
 $AD = \frac{40}{6}$ $x = 12$
 $AD = \frac{20}{3}$

15 $\frac{1}{570} = \frac{18.5}{x}$
 $x = 10,545$ in.
 $\frac{10,545 \text{ in.}}{12 \text{ in./ft}} \approx 879$ ft

16 $2x + 8x = 6$ $\frac{FJ}{FG} = \frac{EK}{EO}$
 $10x = 6$ $\frac{15}{2} = \frac{y}{\frac{6}{5}}$
 $x = \frac{6}{10} = \frac{3}{5}$ $2y = \frac{6}{5}(15)$
 $EO = 2x$ $2y = 18$
 $EO = \frac{6}{5}$ $y = 9, EK = 9$

17 Given: $\overline{OS} \parallel \overline{PR}$

Prove: $\frac{\angle 1}{\angle 2} = \frac{MO}{OP} = \frac{MT}{SR}$



- 1 $\overline{OS} \parallel \overline{PR}$
- 2 $\angle 1 \cong \angle 2$
- 3 $\overline{TR} \cong \overline{SR}$
- 4 $\frac{MO}{OP} = \frac{MT}{TR}$

- 1 Given
- 2 Given
- 3 If Δ then Δ
- 4 A line \parallel to side of Δ and

intersects other sides
divides sides prop

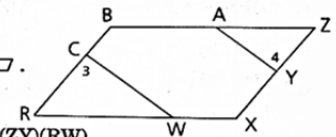
5 $\frac{MO}{OP} = \frac{MT}{SR}$

5 Substitution prop

18 Given: BRXZ is a \square .

$\angle 3 \cong \angle 4$

Prove: $(RC)(ZA) = (ZY)(RW)$



- 1 BRXZ is a \square .
- 2 $\angle 3 \cong \angle 4$
- 3 $\angle R \cong \angle Z$
- 4 $\Delta RCW \sim \Delta ZYA$
- 5 $\frac{RC}{ZY} = \frac{RW}{ZA}$

- 1 Given
- 2 Given
- 3 In a \square opp \angle s are \cong .
- 4 AA~
- 5 Corr sides of ~ Δ s are

prop.

6 $(RC)(ZA) = (ZY)(RW)$

6 Means-Extremes
Products Theorem

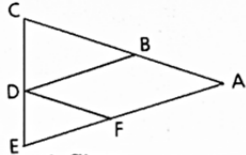
19 $\frac{RS}{RQ} = \frac{PS}{PQ}$
 $\frac{8}{RQ} = \frac{24}{30}$
 $24RQ = 240$
 $RQ = 10$
 $Q = (-13, 0)$

- 20 a A b A
 c N d S
 e N f A
 g A h S

21 Given: $ABDF$ is a \square .

Concl: $\triangle CBD \sim \triangle DFE$

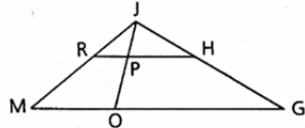
- 1 $ABDF$ is a \square .
- 2 $\overline{CA} \parallel \overline{DF}$
- 3 $\angle C \cong \angle EDF$
- 4 $\angle ABD \cong \angle DFA$
- 5 $\angle EFD$ supp of $\angle DFA$
- 6 $\angle CBD$ supp of $\angle ABD$
- 7 $\angle EFD \cong \angle CBD$
- 8 $\triangle CBD \sim \triangle DFE$



- 1 Given
- 2 In a \square opp sides \parallel .
- 3 \parallel lines \Rightarrow corr \angle s \cong .
- 4 In a \square opp \angle s \cong .
- 5 Supp \angle s form a st \angle .
- 6 Same as 5
- 7 Supps of \cong \angle s are \cong .
- 8 AA~

22 Given: $\overline{HR} \parallel \overline{GM}$
Prove: $\frac{PR}{OM} = \frac{PH}{OG}$

- 1 $\overline{HR} \parallel \overline{GM}$
- 2 $\angle RJP \cong \angle RJP$
- 3 $\angle JPR \cong \angle JOM$
- 4 $\triangle JRP \sim \triangle JMO$
- 5 $\frac{RP}{MO} = \frac{JP}{JO}$
- 6 $\angle JPH \cong \angle JOG$
- 7 $\angle PJH \cong \angle PJH$
- 8 $\triangle JPH \sim \triangle JOG$
- 9 $\frac{JP}{JO} = \frac{PH}{OG}$
- 10 $\frac{PR}{OM} = \frac{PH}{OG}$

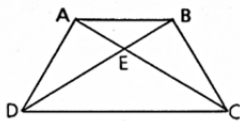


- 1 Given
- 2 Reflexive prop
- 3 \parallel lines \Rightarrow corr \angle s \cong .
- 4 AA~
- 5 Corr sides of \sim Δ s prop.
- 6 \parallel lines \Rightarrow corr \angle s \cong .
- 7 Reflexive prop
- 8 AA~
- 9 Corr sides of \sim Δ s prop.
- 10 Substitution prop

23 Given: $ABCD$ is a trap.

Prove: $\frac{AE}{CE} = \frac{BE}{DE}$

- 1 $ABCD$ is a trap.
- 2 $\overline{AB} \parallel \overline{DC}$
- 3 $\angle BAE \cong \angle DCE$
- 4 $\angle AEB \cong \angle CED$
- 5 $\triangle AEB \sim \triangle CED$
- 6 $\frac{AE}{CE} = \frac{BE}{DE}$



- 1 Given
- 2 A trap is a quad with one pair of \parallel sides.
- 3 \parallel lines \Rightarrow alt int \angle s \cong .
- 4 Vert \angle s \cong .
- 5 AA~
- 6 Corr sides \sim Δ s prop.

24 $3x + 5x + 7x = 78$

$15x = 78$

$x = \frac{78}{15}$ or $\frac{26}{5}$

$3x = 3(\frac{26}{5}) = \frac{78}{5}$

$7x = 7(\frac{26}{5}) = \frac{182}{5}$

$\frac{78}{5} + \frac{182}{5} = \frac{260}{5} = 52$

25 $\frac{x-4}{4} = \frac{x}{6}$

$6x - 24 = 4x$

$2x = 24$

$x = 12$

$P = (12 - 4) + (12) + (4 + 6) = 30$

26 $\frac{7}{x+4y} = \frac{9}{2x-y}$

$9x + 36y = 14x - 7y$

$43y = 5x$

$\frac{x}{y} = \frac{43}{5}$

27 $\frac{NP}{PR} = \frac{NT}{TS}$ $NR = NP + PR$ $NS = NT + TS$

$\frac{5x-21}{5} = \frac{x}{8}$ $NR = 5(\frac{24}{5}) - 21 + 5$ $NS = x + 8$

$40x - 168 = 5x$ $NR = 24 - 21 + 5$ $NS = \frac{24}{5} + 8$

$35x = 168$ $NR = 8$ $NS = \frac{64}{5}$

$x = \frac{24}{5}$ $NR + NS = \frac{40}{5} + \frac{64}{5} = \frac{104}{5}$

28 $80x + 100x + 140x = 400$ $80(\frac{5}{4}) = 100m$

$320x = 400$ $100(\frac{5}{4}) = 125m$

$x = \frac{400}{320}$ $140(\frac{5}{4}) = 175m$

$x = \frac{5}{4}$

29 $\frac{QR}{QP} = \frac{RT}{PT}$ $\frac{QR}{RP} = \frac{RS}{RT}$ $\frac{QR}{RP} = \frac{QS}{PT}$

$\frac{6}{QP} = \frac{21}{28}$ $\frac{6}{14} = \frac{RS}{21}$ $\frac{6}{14} = \frac{QS}{28}$

$QP = 8$ $RS = 9$ $QS = 12$

30 $\triangle ABC \sim \triangle ADE$ by AA~.

So $\frac{5}{15} = \frac{4}{EC+4}$

$5EC + 20 = 60$

$EC = 8$

If $EC = 9$, then

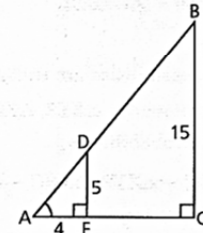
$\frac{5}{15} = \frac{AE}{AE+9}$

$4.5 - 4 = .5$

$5AE + 45 = 15AE$

$AE = 4.5$

Llong's shadow is $\frac{1}{2}$ ft longer.



31 Let a, b, c, d = 1st, 2nd, 3rd, 4th numbers.

$\frac{a}{b} = \frac{2}{3}$ $\frac{b}{c} = \frac{5}{4}$ $\frac{c}{d} = \frac{5}{6}$ and

$a + b + c + d = 771$

Find each number in terms of one letter (use b)

$a = \frac{2}{3}b$, $c = \frac{4}{5}b$, $d = \frac{6}{5}c$ or $d = \frac{6}{5}(\frac{4}{5}b)$

$\frac{2}{3}b + b + \frac{4}{5}b + \frac{24}{25}b = 771$

$50b + 75b + 60b + 72b = 57,825$

$257b = 57,825$

$b = 225$