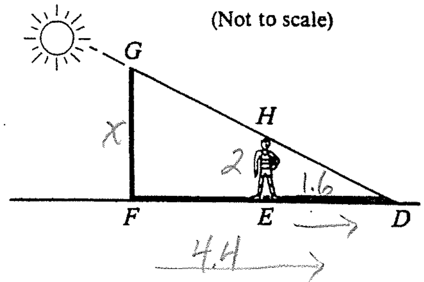
Geometry (H)
Section 7.4 – More problems

Name: KEY

1. To estimate the height of a pole, a basketball player exactly 2 m tall stood so that the ends of his shadow and the shadow of the pole coincided. He found that $\overline{DE}$ and $\overline{DF}$ measured 1.6 m and 4.4 m, respectively. About how tall was the pole?



$\frac{1.6}{2} = \frac{4.4}{x}$

$1.6x = 2(4.4)$

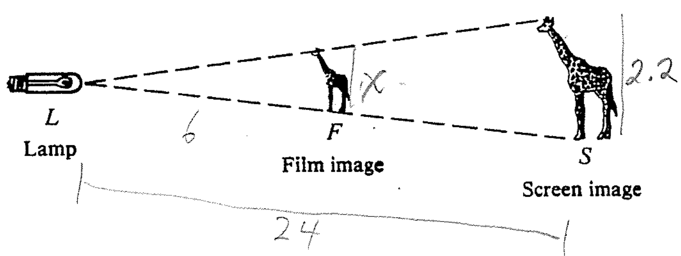
$8x = 44$

$2x = 11$

$x = \frac{11}{2}$

$x = 5\frac{1}{2}$ meters

2. The diagram, *not* drawn to scale, shows a film being projected on a screen. $LF = 6$ cm and $LS = 24$ m. The screen image is 2.2 m tall. How tall is the film image?



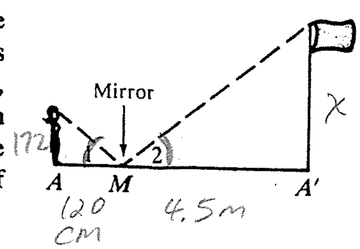
$\frac{6}{x} = \frac{24}{2.2}$

$24x = 6(2.2)$

$4\overline{)2.20}$ = .55

$x = .55$ cm tall

3. You can estimate the height of a flagpole by placing a mirror on level ground so that you see the top of the flagpole in it. The girl shown is 172 cm tall. Her eyes are about 12 cm from the top of her head. By measurement, AM is about 120 cm and $A'M$ is about 4.5 m. From physics it is known that $\angle 1 \cong \angle 2$. Explain why the triangles are similar and find the approximate height of the pole.



$\triangle$s similar b/c AA ~ AA: ① $\angle 1 \cong \angle 2$
② Girl & ground form right $\angle$.
Pole & ground " " $\angle$.

$\frac{120}{172} = \frac{4.5}{x}$

$120x = 172(4.5)$

$x = 6.45$

6.45 meters = flagpole

4. If $\frac{4a - 9b}{4a} = \frac{a - 2b}{b}$, find the numerical value of the ratio $a:b$.

$b(4a-9b) = 4a(a-2b)$

$4ab - 9b^2 = 4a^2 - 8ab$

$0 = 4a^2 - 12ab + 9b^2$

$0 = (2a-3b)(2a-3b)$

$2a - 3b = 0$

$\frac{2a}{2} = \frac{3b}{2}$

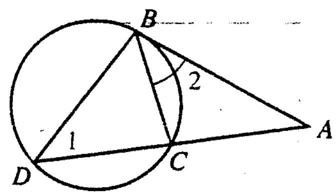
$\frac{a}{b} = \frac{3}{2}$

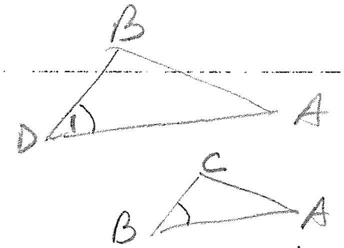
5. Given: $\angle 1 \cong \angle 2$

Prove: $(AB)^2 = AD \cdot AC$

$AB \cdot AB = AD \cdot AC$

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





1 $\measuredangle 1 \cong \measuredangle 2$ }
2 $\measuredangle A \cong \measuredangle A$ } → 3 $\triangle ABD \sim \triangle ACB$ → 4 $\frac{AB}{AD} = \frac{AC}{AB}$ → 5 $(AB)^2 = AD \cdot AC$

1 Given

2 Reflexive property

3 AA ~ AA

4 In ~$\triangle$s → corresp. sides proportionate.

5 Prod. means = prod. extremes

6. Given: $\triangle ABC \sim \triangle XYZ$;
$\overline{AD}$ and $\overline{XW}$ are altitudes.

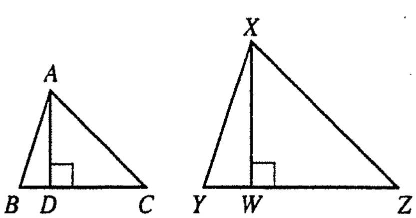
Prove: $\frac{AD}{XW} = \frac{AB}{XY}$

1 $\overline{AD}, \overline{XW}$ altitudes → 1a $\overline{AD} \perp \overline{BC}$, $\overline{XW} \perp \overline{YZ}$ → 2 $\measuredangle ADB$, $\measuredangle XWY$ are rt $\measuredangle$s. → 3 $\measuredangle ADB \cong \measuredangle XWY$

4 $\triangle ABC \sim \triangle XYZ$ → 5 $\measuredangle B \cong \measuredangle Y$

→ 6 $\triangle ABD \sim \triangle XYW$

→ 7 $\frac{AD}{XW} = \frac{AB}{XY}$



Show $\triangle ABD \sim \triangle XYW$

1 Given

1a def. of altitude

2 def. of $\perp$ lines.

3 All rt $\measuredangle$s $\cong$.

4 Given

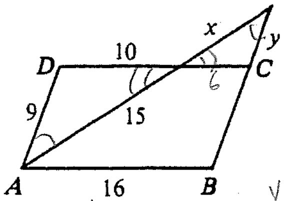
5 In ~$\triangle$s, corresp. $\measuredangle$s $\cong$.

6 AA ~ AA

7 In ~$\triangle$s, corresp. sides proportional.

In Exercises 18 and 19 *ABCD* is a parallelogram. Find the values of x and y.

18.



$\frac{y}{9} = \frac{6}{10}$

$10y = 54$

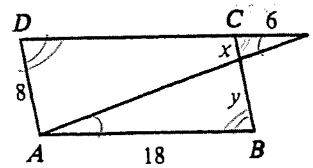
$y = 5\frac{2}{5}$

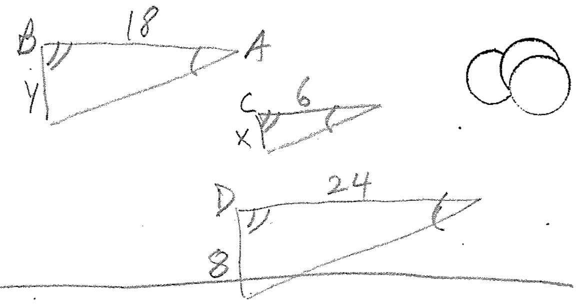
$\frac{10}{6} = \frac{15}{x}$

$10x = 90$

$x = 9$

19.





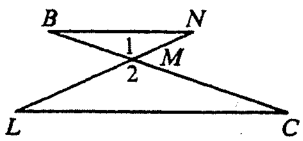
$\frac{8}{y} = \frac{24}{18}$

Reasons for #23

① Given
② vertical ∡s ≅.
③ AA ~ AA
④ ~Δs → corresp. sides proportional
⑤ Means-extremes property of proportions.

23. Given: $\angle B \cong \angle C$
Prove: $NM \cdot CM = LM \cdot BM$

24. Given: $\overline{BN} \parallel \overline{LC}$
Prove: $BN \cdot LM = CL \cdot NM$



(23) show $\frac{NM}{LM} = \frac{BM}{CM}$

① $\angle B \cong \angle C$
② $\angle 1 \cong \angle 2$ → ③ $\triangle BMN \sim \triangle CML$ → ④ $\frac{NM}{LM} = \frac{BM}{CL}$ → ⑤ $NM \cdot CL = BM \cdot LM$

(24) ① $\overline{BN} \parallel \overline{LC}$ → ② $\angle N \cong \angle L$, $\angle B \cong \angle C$ → ③ $\triangle BMN \sim \triangle CML$ → ④ $\frac{BN}{CL} = \frac{NM}{LM}$

→ ⑤ $BN \cdot LM = CL \cdot NM$

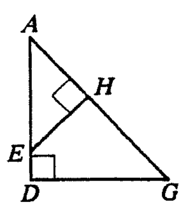
show $\frac{BN}{CL} = \frac{NM}{LM}$

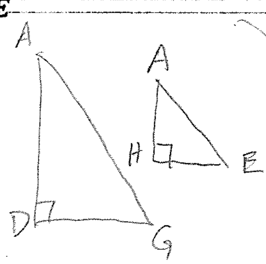
Reasons (24)

① Given
② 2 ∥ lines → alt. int. ∡s ≅.
③ AA ~ AA
④ ~Δs → corresp. sides proportional
⑤ Means - extremes property of proportions

27. Given: $\overline{AH} \perp \overline{EH}$; $\overline{AD} \perp \overline{DG}$
Prove: $AE \cdot DG = AG \cdot HE$

Show $\frac{AE}{AG} = \frac{HE}{DG}$





① $\overline{AH} \perp \overline{EH}$ → ② ∡AHE Rt
$\overline{AD} \perp \overline{DG}$ → ∡D is Rt.
③ ∡A ≅ ∡A
→ ④ $\triangle ADG \sim \triangle AHE$

→ ⑤ $\frac{AE}{AG} = \frac{HE}{DG}$ → ⑥ $AE \cdot DG = AG \cdot HE$

① Given
② Def of ⊥ lines
③ Reflexive prop.
④ A.A. ~ A.A.
⑤ ~Δs → corresp. sides proportional
⑥ Means - Extremes property