Solution

Because the sun is very far from us, its rays are nearly parallel. $\triangle ABC \sim \triangle DEF$ by AA, so we can write a proportion.

$$\frac{x}{35} = \frac{20}{25}$$

$$\frac{x}{35} = \frac{4}{5}$$

$$5x = 140$$

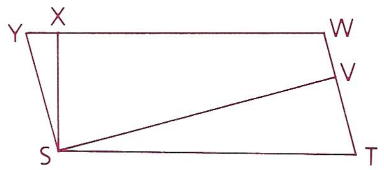
$$x = 28$$

The pole was 28 m high.

Problem 3

Given: $\square$YSTW,
$\overline{SX} \perp \overline{YW}$,
$\overline{SV} \perp \overline{WT}$

Prove: $SX \cdot YW = SV \cdot WT$



Proof

1 $\square$YSTW	1 Given
2 $\angle Y \cong \angle T$	2 Opposite $\angle$s of a $\square$ are $\cong$.
3 $\overline{SX} \perp \overline{YW}$	3 Given
4 $\angle SXY$ is a right $\angle$.	4 $\perp$ segments form right $\angle$s.
5 $\overline{SV} \perp \overline{WT}$	5 Given
6 $\angle SVT$ is a right $\angle$.	6 Same as 4
7 $\angle SXY \cong \angle SVT$	7 Right $\angle$s are $\cong$.
8 $\triangle SXY \sim \triangle SVT$	8 AA (2, 7)
9 $\frac{SX}{SV} = \frac{SY}{ST}$	9 Corresponding sides of $\sim$ $\triangle$s are proportional.
10 $SX \cdot ST = SV \cdot SY$	10 Means-Extremes Products Theorem
11 $\overline{ST} \cong \overline{YW}$	11 Opposite sides of a $\square$ are $\cong$.
12 $\overline{SY} \cong \overline{WT}$	12 Same as 11
13 $SX \cdot YW = SV \cdot WT$	13 Substitution (11 and 12 in 10)

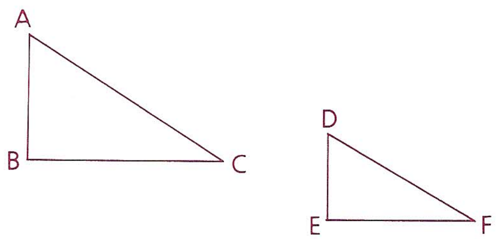
In this proof, we again found it useful to work backwards. This time, lengths YW and WT were not sides of similar triangles. But since SYTW is a parallelogram, we were able to substitute these lengths for the lengths of the opposite sides.

Part Three: Problem Sets

Problem Set A

1 Given: $\angle C \cong \angle F$,
$\overline{AB} \perp \overline{BC}$,
$\overline{DE} \perp \overline{EF}$

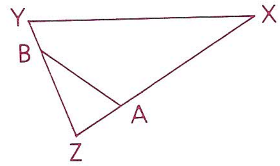
Prove: $\frac{AB}{BC} = \frac{DE}{EF}$



Problem Set A, *continued*

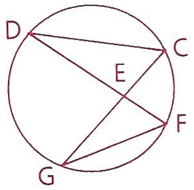
2 Given: $\angle X \cong \angle ZBA$

Conclusion: $\dfrac{AZ}{AB} = \dfrac{ZY}{XY}$



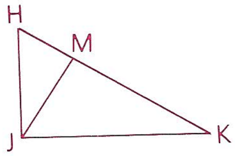
3 Given: $\angle D \cong \angle G$

Conclusion: $\dfrac{CD}{FG} = \dfrac{DE}{EG}$



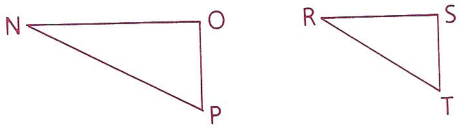
4 Given: $\angle HJK$ is a right $\angle$.
$\overline{JM}$ is an altitude.

Prove: $\dfrac{JM}{MK} = \dfrac{HJ}{JK}$



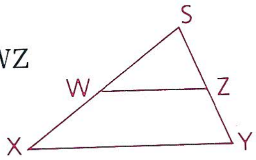
5 Given: $\triangle NOP \sim \triangle RST$

Prove: $NO \cdot RT = RS \cdot NP$



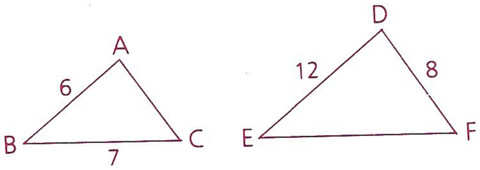
6 Given: $\overleftrightarrow{WZ} \parallel \overleftrightarrow{XY}$

Conclusion: $WS \cdot XY = XS \cdot WZ$



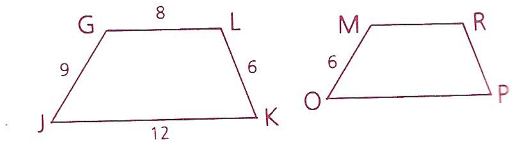
7 $\triangle ABC \sim \triangle DEF$

Find: AC and EF



8 Given: $GJKL \sim MOPR$

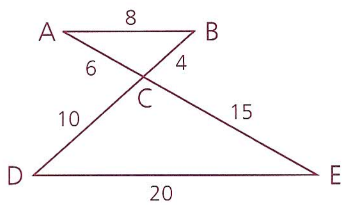
Find: OP, PR, and MR



9 *A shadow problem:* Mannertink observed that a tree was casting a 30-m shadow. A nearby flagpole was casting a 24-m shadow. If the flagpole was 20 m high, how tall was the tree?

10 If two similar kites have perimeters of 21 and 28, what is the ratio of the measures of two corresponding sides?

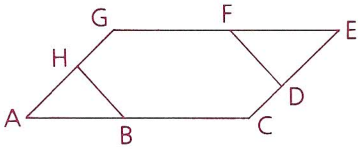
11 Using the diagram at the right, show that $\overline{AB} \parallel \overline{DE}$.



Problem Set B

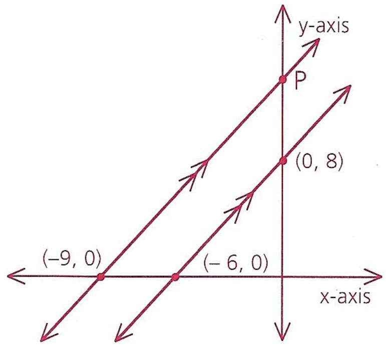
12 Given: ▱ACEG, with F the midpoint of EG, $\angle ABH \cong \angle EFD$

Prove: $AB \cdot FD = HB \cdot GF$



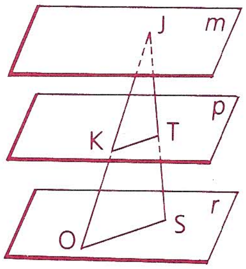
13 Prove that the ratio of corresponding altitudes of similar triangles is equal to the ratio of any pair of corresponding sides of the triangles.

14 Find the coordinates of point P in the diagram.



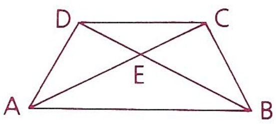
15 Given: $m \parallel p \parallel r$;
J lies in m.
$\overline{KT}$ lies in p.
$\overline{OS}$ lies in r.

Prove: $\dfrac{JK}{JO} = \dfrac{JT}{JS}$



16 Given: Trapezoid ABCD, with bases $\overline{AB}$ and $\overline{CD}$

Prove: $AE \cdot CD = EC \cdot AB$



17 Given: $\angle M \cong \angle S$,
$MP = 8$,
$PR = 6$,
$SP = 7$

Find: PO