

Solution

It does not matter which edges are given the lengths 3, 5, and 7. Let $AD = 3$, $AB = 7$, and $HD = 5$, and use the Pythagorean Theorem twice.

In $\triangle ABD$,

$$3^2 + 7^2 = (DB)^2$$

$$9 + 49 = (DB)^2$$

$$\sqrt{58} = DB$$

In $\triangle HDB$,

$$5^2 + (\sqrt{58})^2 = (HB)^2$$

$$25 + 58 = (HB)^2$$

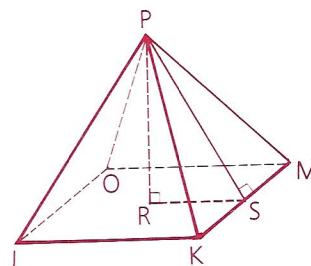
$$\sqrt{83} = HB$$

The measure of the diagonal is $\sqrt{83}$.

Problem 2

Given: The regular square pyramid shown, with altitude \overline{PR} and slant height \overline{PS} , perimeter of $\overline{JKMO} = 40$, $PK = 13$

Find: **a** \overline{JK} **b** \overline{PS} **c** \overline{PR}

**Solution**

a $\overline{JK} = \frac{1}{4}(40) = 10$

b The slant height of the pyramid is the \perp bis. of \overline{MK} , so $\triangle PSK$ is a right \triangle .

$$(\overline{SK})^2 + (\overline{PS})^2 = (\overline{PK})^2$$

$$5^2 + (\overline{PS})^2 = 13^2$$

$$\overline{PS} = 12$$

c The altitude of a regular pyramid is perpendicular to the base at its center. Thus, $\overline{RS} = \frac{1}{2}(\overline{JK}) = 5$, and $\triangle PRS$ is a right \triangle .

$$(\overline{RS})^2 + (\overline{PR})^2 = (\overline{PS})^2$$

$$5^2 + (\overline{PR})^2 = 12^2$$

$$25 + (\overline{PR})^2 = 144$$

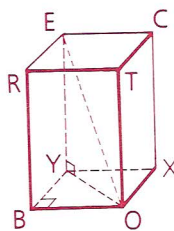
$$\overline{PR} = \sqrt{119}$$

Part Three: Problem Sets**Problem Set A**

1 Given: The rectangular solid shown, $\overline{BY} = 3$, $\overline{OB} = 4$, $\overline{EY} = 12$

Find: **a** \overline{YO} , a diagonal of face \overline{BOXY}

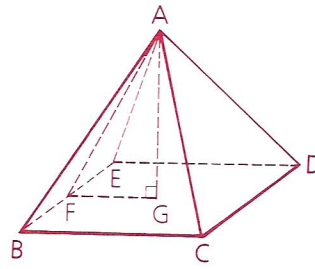
b \overline{EO} , a diagonal of the solid



2 Find the diagonal of a rectangular solid whose dimensions are 3, 4, and 5.

- 3 Given: Regular square pyramid $ABCDE$,
with slant height \overline{AF} , altitude \overline{AG} ,
and base $BCDE$;
perimeter of $BCDE = 40$,
 $\angle AFG = 60^\circ$

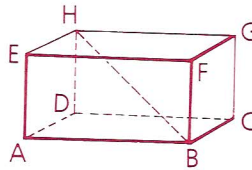
Find: The altitude and the slant height



- 4 Given: The rectangular solid shown,
 $GC = 8$, $HG = 12$, $BC = 9$

Find: a HB , a diagonal of the solid

b AG , another diagonal of the solid



- 5 Given: The regular square pyramid shown, with altitude
 \overline{PY} and slant height \overline{PR} ,
 $ID = 14$, $PY = 24$

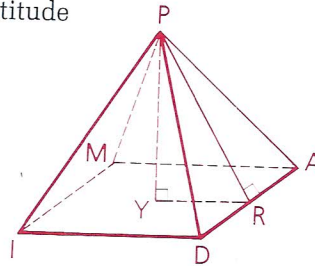
Find: a AD

b YR

c PR

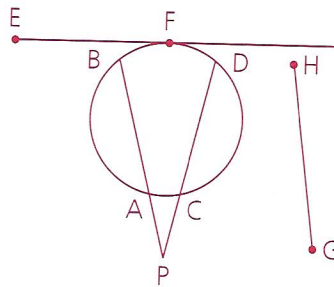
d The perimeter of base $AMID$

e A diagonal of the base (not shown
in the diagram)



- 6 Find the slant height of a regular square pyramid if the altitude
is 12 and one of the sides of the square base is 10.

- 7 A line that intersects a circle at two
points is called a *secant*. Which of the
four lines in the diagram (\overleftrightarrow{EF} , \overleftrightarrow{PB} , \overleftrightarrow{PD} ,
and \overleftrightarrow{GH}) are secants?



- 8 Given: Diagram as marked
Find: $m\widehat{AC}$

