

**Sheet 1291: Cumulative Review Chapters 4–12**

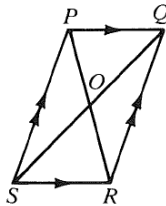
**Chapters 4–7**

Complete each statement with the word *always*, *sometimes*, or *never*.

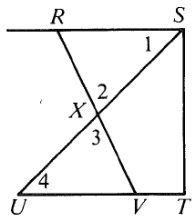
1. A square is \_\_\_\_\_ a rhombus.
2. The inverse of a true statement is \_\_\_\_\_ true.
3. Similar figures are \_\_\_\_\_ congruent.
4. An acute triangle and an obtuse triangle are \_\_\_\_\_ similar.
5. The base angles of an isosceles trapezoid are \_\_\_\_\_ congruent.

Refer to the diagram at the right. Tell whether each statement *must* be true.

6.  $\overline{PQ} \cong \overline{SR}$  and  $\overline{PS} \cong \overline{QR}$
7.  $\angle RSP \cong \angle PQR$
8.  $\angle SPQ \cong \angle PQR$
9.  $\angle SPQ$  and  $\angle PQR$  are supp.  $\sphericalangle$ .
10.  $\overline{PR} \perp \overline{SQ}$
11.  $\overline{SO} \cong \overline{OQ}$
12.  $\overline{PS} \cong \overline{SR}$



13. Refer to the diagram below.



Supply the reasons.

Given:  $\overline{ST} \perp \overline{RS}$ ;  $\overline{ST} \perp \overline{UT}$ ;  $\overline{RS} \cong \overline{UV}$

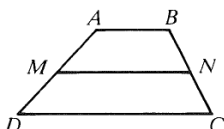
Prove:  $\overline{RV}$  and  $\overline{US}$  bisect each other.

Proof:

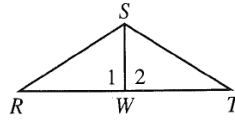
1.  $\overline{ST} \perp \overline{RS}$ ;  $\overline{ST} \perp \overline{UT}$
2.  $\overline{RS} \parallel \overline{UT}$
3.  $\angle 1 \cong \angle 4$
4.  $\angle 2 \cong \angle 3$
5.  $\overline{RS} \cong \overline{UV}$
6.  $\triangle SXR \cong \triangle UXV$
7.  $\overline{RX} \cong \overline{VX}$ ;  $\overline{SX} \cong \overline{UX}$
8.  $\overline{RV}$  and  $\overline{US}$  bisect each other.

$\overline{MN}$  is the median of trapezoid  $ABCD$ .

14. If  $AM = 3$  and  $BN = 2$ , then  $MD = ?$  and  $NC = ?$ .
15. If  $AB = 10$  and  $DC = 14$ , then  $MN = ?$ .



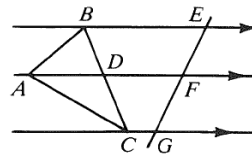
16. If  $\overline{SW}$  is an altitude of  $\triangle RST$ , then  $m\angle 2 = ?$ .
17. If  $\overline{SW}$  is a median of  $\triangle RST$ , then  $? \cong ?$ .
18. If  $S$  is equidistant from  $R$  and  $T$ , then  $S$  lies on the  $?$  of  $\overline{RT}$ .



19. The lengths of two sides of a triangle are 10 and 13. The length of the third side must be greater than  $?$ , but less than  $?$ .
20. If two angles of a triangle are congruent to two angles of another triangle, then the triangles are  $?$ .
21. The ratio of a side of a square to the perimeter of the square is  $?$ .
22. The measures of the angles of a quadrilateral are in the ratio 2:4:5:7. Find the measures of the angles.

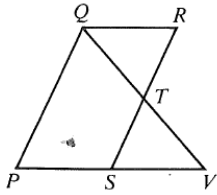
If you are interested, try this by using Theorems 7–3 and 7–4 on p. 269.

25. Given:  $\overleftrightarrow{BE} \parallel \overleftrightarrow{AF} \parallel \overleftrightarrow{CG}$ ;  
 $\overline{AF}$  bisects  $\angle BAC$ .  
 Prove:  $\frac{AB}{AC} = \frac{EF}{FG}$

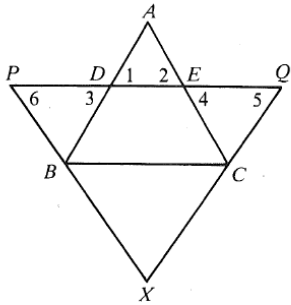


Name: \_\_\_\_\_

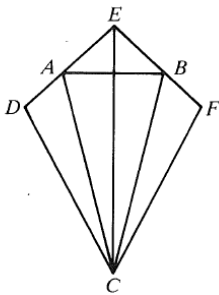
26. Given:  $\triangle QRT \cong \triangle VST$ ;  $S$  is the midpoint of  $\overline{PV}$ .  
 Prove: Quadrilateral  $PQRS$  is a parallelogram.



27. Given:  $\overline{AD} \cong \overline{AE}$ ;  $\overline{PX} \cong \overline{QX}$ ;  $\overline{PD} \cong \overline{EQ}$   
 Prove:  $\overline{BD} \cong \overline{CE}$



28. Given:  $\overline{DC} \cong \overline{FC}$ ;  $\overline{DE} \cong \overline{FE}$ ;  $\overline{DA} \cong \overline{FB}$   
 Prove:  $\triangle DAC \cong \triangle FBC$



Name: \_\_\_\_\_

**Chapters 8–10**

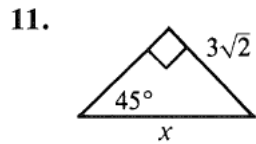
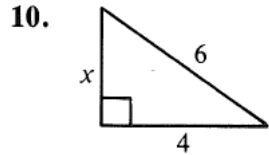
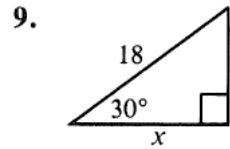
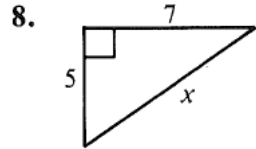
For the following questions, use compass and straightedge, only.

Classify each statement as true or false.

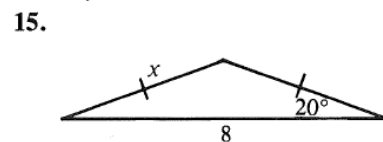
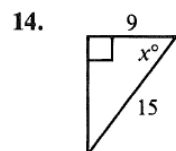
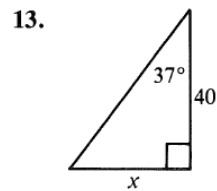
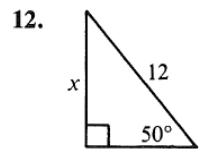
5. In right  $\triangle ABC$ , the tangent of  $\angle B$  is  $\frac{\text{leg opposite } \angle B}{\text{leg adjacent to } \angle B}$ .

6. When two or more lines intersect in one point, the lines are concurrent.

Find the value of  $x$ .



Find the value of  $x$  to the nearest tenth or to the nearest degree. Use a calculator or the table on page 311.



20. Construct a  $30^\circ$  angle.

Use the following segments, a compass, and a straightedge.

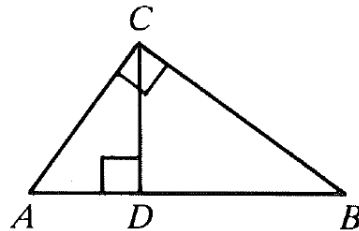


23. Construct a right triangle with legs of lengths  $a$  and  $b$ .

If you are interested, try this by using Construction 14 on page 397.

24. Construct a segment of length  $d$  such that  $ad = bc$ .

In the following questions,  $CD = 12$ . (Write so in the diagram.)



31. If  $AC = 15$ , find  $AD$ .

32. If  $AD = 4$ , find  $DB$ .

33. If  $DB = 16$ , find  $BC$ .

34. If  $AB = 26$  and  $AD < BD$ , find  $AD$ .

Name: \_\_\_\_\_

## Chapters 11–12

Find each of the following.

1. The volume of a sphere with radius 10 cm.
3. The volume of a cylinder with height 10 and *diameter* 10.
4. The volume of a regular square pyramid with base edges 8 and height 3.
5. The total area of the pyramid in Exercise 4.
6. The lateral area of a cone with slant height 14 and radius 9.
9. The area of a rhombus with diagonals 8 and 18.
11. The area of a sphere with radius 5.

20. The ratio of the volumes of two similar prisms is  $64/27$ . Find the ratio of their lateral areas.

21. Find the area of a right triangle with hypotenuse 13 and leg 5.

25. Find the height of a trapezoid with bases 9 cm and 15 cm long and area  $60 \text{ cm}^2$ .

26. A right triangular prism has height 6 and base edges 5, 5, and 8. Find the total area.

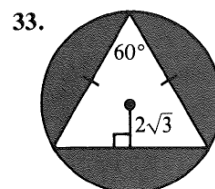
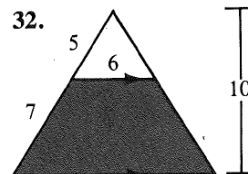
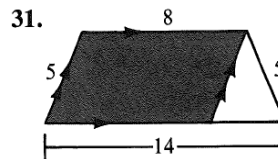
27. A regular square pyramid has lateral edge  $\sqrt{34}$  (*square root of 34*) and base edge 6. Find the volume.

28. A cone with radius 6 has lateral area  $60\pi$ . Find the volume.

29. Find the circumference of the circle that can be circumscribed about a square with side 3 cm.

30. The lateral areas of two similar square pyramids are  $20 \text{ m}^2$  and  $125 \text{ m}^2$ , respectively. The volume of the smaller pyramid is  $8 \text{ m}^3$ . Find the volume of the larger pyramid.

Find the area of each shaded region.



38. Find the edge of a cube with total area  $150 \text{ cm}^2$ .

# KEY

Name: \_\_\_\_\_

## Sheet 1291: Cumulative Review Chapters 4-12

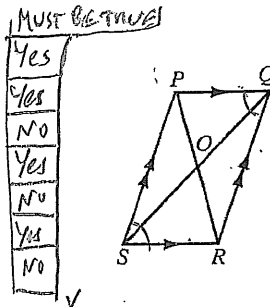
### Chapters 4-7

Complete each statement with the word *always*, *sometimes*, or *never*.

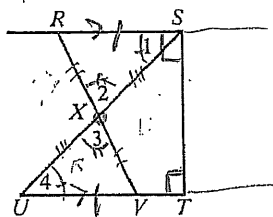
- A square is always a rhombus. always
- The inverse of a true statement is sometimes true. sometimes
- Similar figures are sometimes congruent. sometimes
- An acute triangle and an obtuse triangle are never similar. never
- The base angles of an isosceles trapezoid are always congruent. always

Refer to the diagram at the right. Tell whether each statement *must* be true.

- $\overline{PQ} \cong \overline{SR}$  and  $\overline{PS} \cong \overline{QR}$
- $\angle RSP \cong \angle PQR$
- $\angle SPQ \cong \angle PQR$
- $\angle SPQ$  and  $\angle PQR$  are supp.  $\angle$ s.
- $\overline{PR} \perp \overline{SQ}$
- $\overline{SO} \cong \overline{OQ}$
- $\overline{PS} \cong \overline{SR}$



13. Refer to the diagram below.



Supply the reasons.

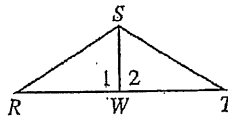
Given:  $\overline{ST} \perp \overline{RS}$ ;  $\overline{ST} \perp \overline{UT}$ ;  $\overline{RS} \cong \overline{UV}$   
 Prove:  $\overline{RV}$  and  $\overline{US}$  bisect each other.

- Proof:
- $\overline{ST} \perp \overline{RS}$ ;  $\overline{ST} \perp \overline{UT}$
  - $\overline{RS} \parallel \overline{UT}$
  - $\angle 1 \cong \angle 4$
  - $\angle 2 \cong \angle 3$
  - $\overline{RS} \cong \overline{UV}$
  - $\triangle SXR \cong \triangle UXV$
  - $\overline{RX} \cong \overline{VX}$ ;  $\overline{SX} \cong \overline{UX}$
  - $\overline{RV}$  and  $\overline{US}$  bisect each other.

REASONS

Given  
 Two lines  $\perp$  to a line are  $\parallel$   
 If two  $\parallel$  lines are cut by a transversal, then Alt. Int.  $\angle$ s are  $\cong$   
 Vertical  $\angle$ s are  $\cong$ . (ASA theorem)  
 Given  
 AAS theorem  
 CPCTE  
 Definition of bisector

- If  $\overline{SW}$  is an altitude of  $\triangle RST$ , then  $m\angle 2 = ?$  90
- If  $\overline{SW}$  is a median of  $\triangle RST$ , then  $? \cong ?$ .  $\overline{RW} \cong \overline{WT}$
- If  $S$  is equidistant from  $R$  and  $T$ , then  $S$  lies on the  $?$  of  $\overline{RT}$ .  $\perp$  Bisector



- The lengths of two sides of a triangle are 10 and 13. The length of the third side must be greater than  $?$ , but less than  $?$ . 3, 23

20. If two angles of a triangle are congruent to two angles of another triangle, then the triangles are similar. Similar AApostulate

21. The ratio of a side of a square to the perimeter of the square is 1/4. 1/4

22. The measures of the angles of a quadrilateral are in the ratio 2:4:5:7. Find the measures of the angles.

$$2x + 4x + 5x + 7x = 360$$

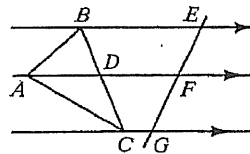
$$18x = 360$$

$$x = 20$$

Answer = 40, 80, 100, 140

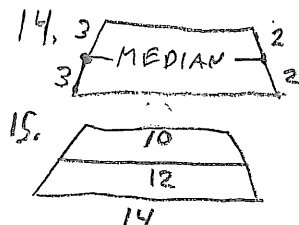
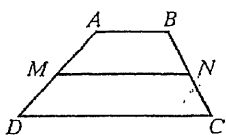
If you are interested, try this by using Theorems 7-3 and 7-4 on p. 269.

25. Given:  $\overline{BE} \parallel \overline{AF} \parallel \overline{CG}$ ;  
 $\overline{AF}$  bisects  $\angle BAC$ ;  
 Prove:  $\frac{AB}{AC} = \frac{EF}{FG}$



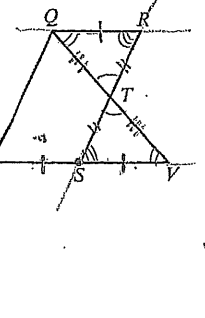
$\overline{MN}$  is the median of trapezoid  $ABCD$ .

- If  $AM = 3$  and  $BN = 2$ , then  $MD = ?$  and  $NC = ?$ . 3, 2
- If  $AB = 10$  and  $DC = 14$ , then  $MN = ?$ . 12



26. Given:  $\triangle QRT \cong \triangle VST$ ; S is the midpoint of  $\overline{PV}$ .  
 Prove: Quadrilateral PQRS is a parallelogram. **WANT**

- WAYS TO PROVE**
- both pairs are  $\parallel$
  - both pairs are  $\cong$
  - one pair both  $\parallel$  and  $\cong$
  - both pairs of opp  $\angle$ 's  $\cong$
  - Diagonals bisect

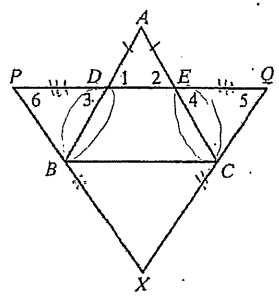


$\overline{PS} \parallel \overline{QR}$   
 $\overline{PS} \cong \overline{QR}$   
**Need**  
 AIAA  
 CPCTC  
**Start with**  
 $\overline{PS} \parallel \overline{QR}$

26.

STATEMENT	REASON
1. $\triangle QRT \cong \triangle VST$	1. Given
2. $\angle RQT \cong \angle SVT$	2. CPCTC
3. $\overline{PV} \parallel \overline{QR}$	3. If 2 lines are cut by a transversal and A.I.A are $\cong$ , then lines are $\parallel$ .
4. $\overline{PS} \parallel \overline{QR}$	4. $\overline{PS}$ lies on $\overline{PV}$
5. S is midpoint of $\overline{PV}$	5. Given
6. $\overline{PS} \cong \overline{SV}$	6. Def. of midpoint
7. $\overline{SV} \cong \overline{QR}$	7. CPCTC (of given $\triangle$ )
8. $\overline{PS} \cong \overline{QR}$	8. Trans. Prop.
9. Quad PQRS is a $\square$	9. If one pair of opp. sides, are both $\cong$ and $\parallel$ then the quad is a $\square$ .

27. Given:  $\overline{AD} \cong \overline{AE}$ ;  $\overline{PX} \cong \overline{QX}$ ;  $\overline{PD} \cong \overline{EQ}$   
 Prove:  $\overline{BD} \cong \overline{CE}$

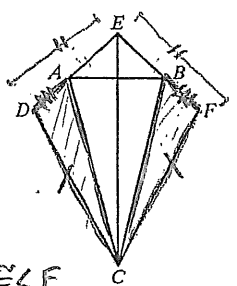


Get:  $\triangle PDB \cong \triangle QEC$   
 From ASA:  $\angle 6 \cong \angle 5$  (Isosc.  $\triangle$ )  
 $\overline{PD} \cong \overline{EQ}$  (given)  
 $\angle 3 \cong \angle 4$  (Vert. Ang.)

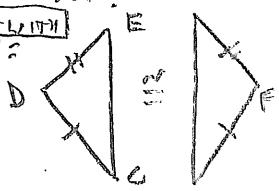
27.

STATEMENT	REASON
1. $\overline{AD} \cong \overline{AE}$	1. Given
2. $\angle 1 \cong \angle 2$	2. Isosceles $\triangle$ Thm (base angles $\cong$ )
3. $\angle 1 \cong \angle 3$ , $\angle 2 \cong \angle 4$	3. Vertical angles are $\cong$
4. $\angle 3 \cong \angle 4$	4. Trans. prop. (twice)
5. $\overline{PD} \cong \overline{EQ}$	5. Given
6. $\angle 6 \cong \angle 5$	6. Isosc. $\triangle$ Thm
7. $\triangle PDB \cong \triangle QEC$	7. ASA Postulate
8. $\overline{BD} \cong \overline{CE}$	8. CPCTC.

28. Given:  $\overline{DC} \cong \overline{FC}$ ;  $\overline{DE} \cong \overline{FE}$ ;  $\overline{DA} \cong \overline{FB}$   
 Prove:  $\triangle DAC \cong \triangle FBC$



Need  $\angle D \cong \angle F$   
 and use SAS  
**Start with**  
 SSS:



28.

STATEMENT	REASON
1. $\overline{DC} \cong \overline{FC}$	1. Given
2. $\overline{DE} \cong \overline{FE}$	2. Given
3. $\overline{EC} \cong \overline{EC}$	3. Reflexive Prop.
4. $\triangle CDE \cong \triangle CFE$	4. SSS Postulate
5. $\angle D \cong \angle F$	5. CPCTC
6. $\overline{DA} \cong \overline{FB}$	6. Given
7. $\triangle DAC \cong \triangle FBC$	7. SAS Postulate

**Chapters 8-10**

Classify each statement as true or false.

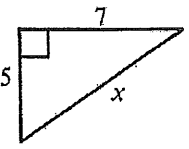
5. In right  $\triangle ABC$ , the tangent of  $\angle B$  is  $\frac{\text{leg opposite } \angle B}{\text{leg adjacent to } \angle B}$ .

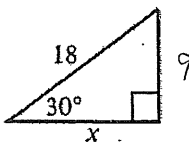
TRUE ✓

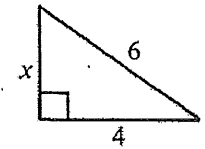
6. When two or more lines intersect in one point, the lines are concurrent.

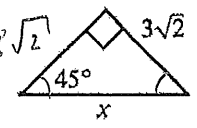
TRUE ✓

Find the value of  $x$ .

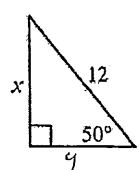
8.   $x^2 = 5^2 + 7^2$   
 $x = \sqrt{25 + 49}$   
 $x = \sqrt{74}$  ✓

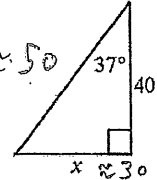
9.   $x = 9\sqrt{3}$  ✓ 15.5885

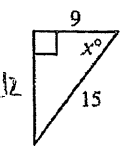
10.   $x^2 + 4^2 = 6^2$   
 $x^2 = 36 - 16$   
 $x^2 = 20$   
 $x = 2\sqrt{5}$  ✓

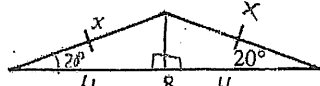
11.   $x = (3\sqrt{2})\sqrt{2}$   
 $x = 6$  ✓

Find the value of  $x$  to the nearest tenth or to the nearest degree. Use a calculator or the table on page 311.

12.   $\frac{x}{12} = \sin 50^\circ$   
 $x = 12 \sin 50^\circ$   
 $x = 9.2$  ✓

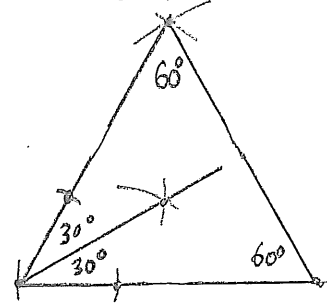
13.   $\frac{x}{40} = \tan 37^\circ$   
 $x = 40 \tan 37^\circ$   
 $x = 30.1$  ✓

14.   $9^2 + y^2 = 15^2$   
 $y = \sqrt{144} = 12$   
 $\tan x = \frac{12}{9}$   
 $x = \tan^{-1}(\frac{4}{3})$   
 $x = 53^\circ$  ✓

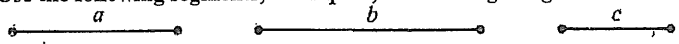
15.   $\cos(20^\circ) = \frac{4}{x}$   
 $x = \frac{4}{\cos(20^\circ)}$   
 $x = 4.3$  ✓

For the following questions, use compass and straightedge, only.

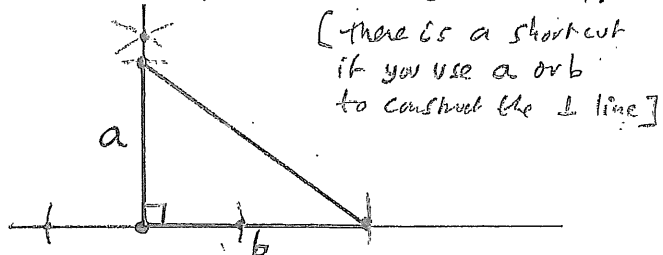
20. Construct a  $30^\circ$  angle. **EQUILATERAL  $\triangle$ . BISECT ANGLE. (CONSTRUCTION 3)**



Use the following segments, a compass, and a straightedge.



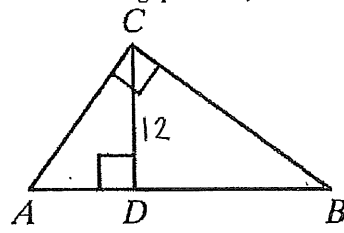
23. Construct a right triangle with legs of lengths  $a$  and  $b$ .  
**CONSTRUCTION 5:** Given a point on a line, construct the perpendicular to the line at the given point. THEN COPY SEGMENTS  $a$  AND  $b$  (CONSTRUCTION 1).



If you are interested, try this by using Construction 14 on page 397.

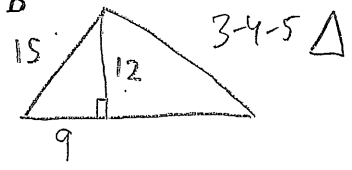
24. Construct a segment of length  $d$  such that  $ad = be$ .

In the following questions,  $CD = 12$ . (Write so in the diagram.)



31. If  $AC = 15$ , find  $AD$ .

$AD = 9$  ✓



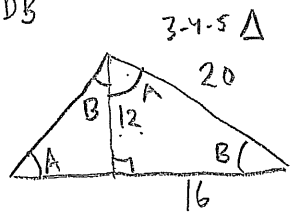
32. If  $AD = 4$ , find  $DB$ .

$\tan B = \frac{4}{12}$   
 $\frac{4}{12} = \frac{12}{DB}$   
 $DB = \frac{12 \cdot 12}{4}$   
 $DB = 36$  ✓



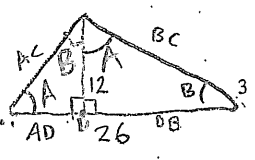
33. If  $DB = 16$ , find  $BC$ .

$BC = 20$  ✓



34. If  $AB = 26$  and  $AD < BD$ , find  $AD$ .

$\tan A = \frac{12}{AD}$   
 $\frac{12}{AD} = \frac{12}{BD}$   
 $DB \cdot AD = 144$   
**FACTORS OF 144 THAT ADD TO 26 = 8 and 18.**  
 $AD + DB = 26$   
 $AD = 8$  ✓



**Chapters 11-12**

Find each of the following.

1. The volume of a sphere with radius 10 cm.  
 $V = \frac{4}{3}\pi(10\text{ cm})^3 = \frac{4000}{3}\pi\text{ cm}^3$

3. The volume of a cylinder with height 10 and diameter 10.  
 $r=5, V = \pi r^2 h = \pi(5)^2 \cdot 10 = 250\pi$

4. The volume of a regular square pyramid with base edges 8 and height 3.  
 $V = \frac{1}{3}(8)^2 \cdot 3 = 64$   $B = 8^2 = 64$

5. The total area of the pyramid in Exercise 4.  
 $L.A. = \frac{1}{2}p \cdot l = \frac{1}{2}(4 \cdot 8) \cdot 5 = 80$   
 $T.A. = 80 + 64 = 144$

6. The lateral area of a cone with slant height 14 and radius 9.  
 $L.A. = \frac{1}{2}p \cdot l = \pi r \cdot l = \pi \cdot 9 \cdot 14 = 126\pi$

9. The area of a rhombus with diagonals 8 and 18.  
 $A = \frac{1}{2}d_1 d_2 = \frac{1}{2} \cdot 8 \cdot 18 = 72$

11. The area of a sphere with radius 5.  
 $A = 4\pi r^2 = 4\pi \cdot 25 = 100\pi$

20. The ratio of the volumes of two similar prisms is 64/27. Find the ratio of their lateral areas.

$\frac{V_1}{V_2} = \frac{64}{27}, \frac{R_1}{R_2} = \frac{\sqrt[3]{64}}{\sqrt[3]{27}} = \frac{4}{3}, \frac{A_1}{A_2} = \frac{16}{9}$   
 [RATIO = 4/3. AREA = 4^2/3^2 = 16/9. VOLUME = 4^3/3^3 = 64/27.]

21. Find the area of a right triangle with hypotenuse 13 and leg 5.  
 $5-12-13 \Delta, A = \frac{1}{2} \cdot 5 \cdot 12 = 30$

25. Find the height of a trapezoid with bases 9 cm and 15 cm long and area 60 cm<sup>2</sup>.  
 $A = \frac{1}{2}(b_1 + b_2) \cdot h$   
 $60 = \frac{1}{2}(9 + 15) \cdot h$   
 $60 = 12h, h = 5\text{ cm}$

26. A right triangular prism has height 6 and base edges 5, 5, and 8. Find the total area.  
 $H=6, B = 2 \cdot \frac{1}{2}(3 \cdot 4) = 12$   
 $L.A. = p \cdot l = (5+5+8) \cdot 6 = 108, T.A. = 132$

27. A regular square pyramid has lateral edge  $\sqrt{34}$  (square root of 34) and base edge 6. Find the volume.  
 $(\sqrt{34})^2 = (3\sqrt{2})^2 + h^2$   
 $34 = 18 + h^2, 16 = h^2, h = 4$   
 $V = \frac{1}{3}Bh = \frac{1}{3}(36) \cdot 4 = 48$

28. A cone with radius 6 has lateral area 60π. Find the volume.

$A = \frac{1}{2}p \cdot l = \pi r \cdot l \rightarrow H = 8$   
 $60\pi = \pi \cdot 6 \cdot l, l = 10$   
 $V = \frac{1}{3}B \cdot h = \frac{1}{3}\pi 6^2 \cdot 8 = 96\pi$

29. Find the circumference of the circle that can be circumscribed about a square with side 3 cm.

$1.5\sqrt{2}$   
 $C = 2\pi r$   
 $C = 2\pi(1.5\sqrt{2})$   
 $C = 3\sqrt{2}\pi\text{ cm}$

30. The lateral areas of two similar square pyramids are 20 m<sup>2</sup> and 125 m<sup>2</sup>, respectively. The volume of the smaller pyramid is 8 m<sup>3</sup>. Find the volume of the larger pyramid.

RATIO OF LENGTHS = 2.5 ( $\sqrt{6.25}$ )  
 RATIO OF AREAS = 6.25 ( $2.5^2$ )  
 RATIO OF VOLUMES = 15.625 ( $2.5^3$ )  
 $V_{LARGE} = V_{SMALL} \cdot 15.625 = 8 \cdot 15.625 = 125\text{ m}^3$

31. Find the area of each shaded region.  
 W/IE SMALL Δ TO FIND HEIGHT.  
 $H = 4$  (3-4-5 Δ)  
 $A = 8 \cdot 4 = 32$

32. TRIANGLES PROPORTIONAL  
 LARGE Δ BASE = b  
 $\frac{5}{12} = \frac{6}{b}$   
 $5b = 12 \cdot 6$   
 $b = 12 \cdot 6 / 5$   
 $b = 72/5 = 14.4$   
 LARGE TRIANGLE:  $A = \frac{1}{2}(b)(h)$   
 $A = \frac{1}{2}(\frac{72}{5})(10) = 72$   
 SMALL Δ HEIGHT = x (NOT 4 SINCE NOT A 3-4-5 Δ)  
 $\frac{x}{6} = \frac{10}{b}$   
 $x = \frac{10 \cdot 6}{(\frac{72}{5})} = \frac{(60)(5)}{72} = \frac{25}{6}$   
 SMALL Δ =  $A = \frac{1}{2}(6)(\frac{25}{6}) = 12.5$   
 SHADOW Δ =  $A = 72 - 12.5 = 59.5$

38. Find the edge of a cube with total area 150 cm<sup>2</sup>.  
 $38 \cdot A = 6s^2$   
 $150 = 6s^2$   
 $s^2 = 25$   
 $s = 5\text{ cm}$   
 CENTROID IS 1/3 HEIGHT FROM BASE.  
 $A_{\Delta} = \frac{1}{2}(12)(6\sqrt{3}) = 36\sqrt{3}$   
 $A_{\odot} = \pi(4\sqrt{3})^2 = 48\pi$   
 $A_{SHADOW} = 48\pi - 36\sqrt{3}$

KEY

Name: \_\_\_\_\_