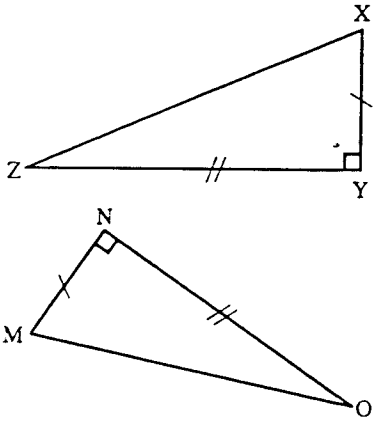
SOUTH SYDNEY HIGH SCHOOL

MATHS – EXT1 WORKSHEETS

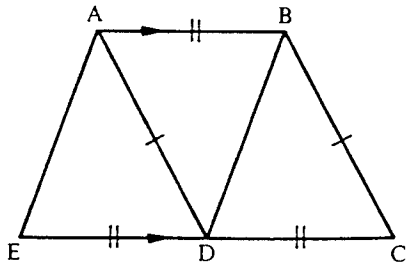
CONGRUENCE & SIMILARITY

Exercises

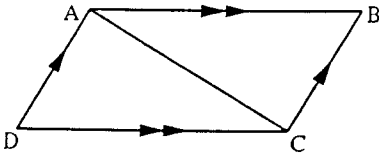
16. Show that triangles XYZ and MNO are congruent.



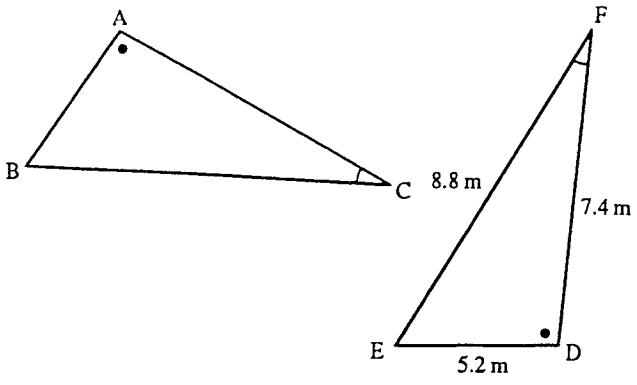
17. Prove that $\triangle AED \equiv \triangle ABD \equiv \triangle BCD$.



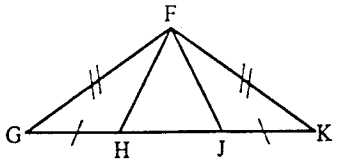
18. Show that $\triangle ABC$ and $\triangle ADC$ are congruent.



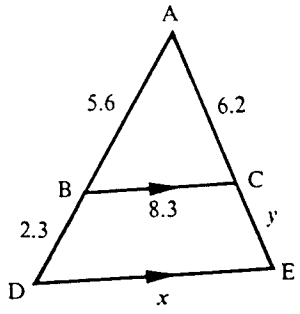
19. Given that $\triangle ABC \equiv \triangle DEF$, find the length of side AC.



20. Prove that triangles FGH and FKJ are congruent.



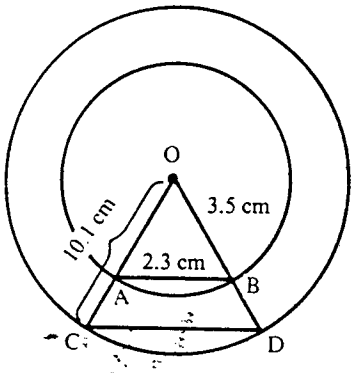
21. Find the values of x and y.



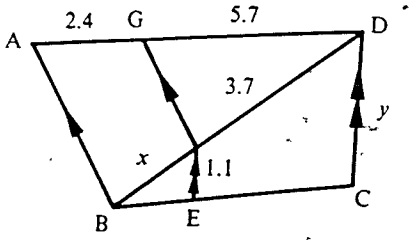
22. The diagram shows two concentric circles with centre O.

(a) Prove that $\triangle OAB \,|||\, \triangle OCD$.

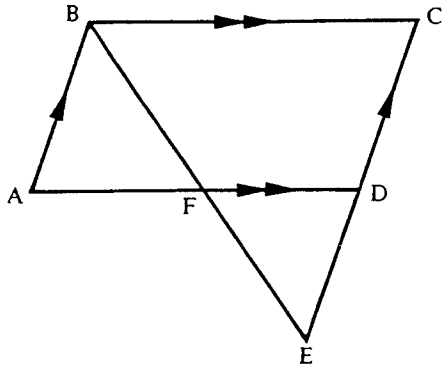
(b) If radius OC = 10.1 cm and radius OB = 3.5 cm, and the length of AB = 2.3 cm find the length of CD (correct to 2 decimal places).



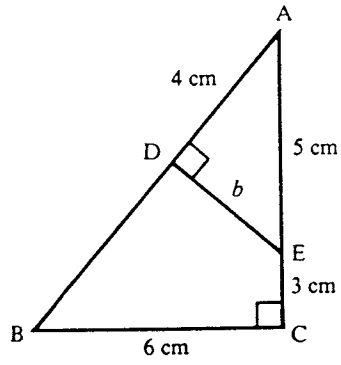
23. Find the values of x and y correct to 2 decimal places.



24. ABCD is a parallelogram with CD produced to E. Prove that $\triangle ABF \,|||\, \triangle CEB$.



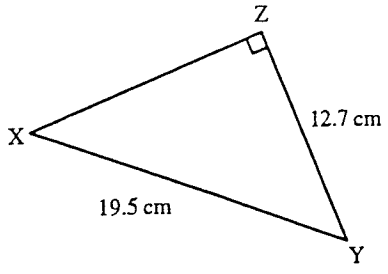
25. Show that $\triangle AED \,|||\, \triangle ABC$. Find the value of b.



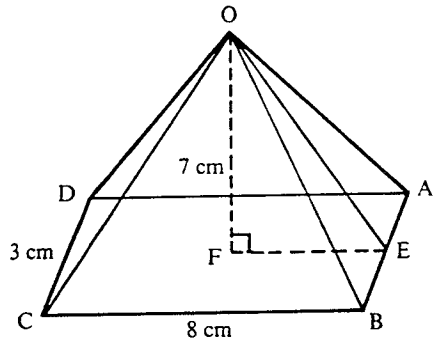
PYTHAGORAS THEOREM

26. Find the slant height of a cone with diameter 1.2 m and perpendicular height 3.7 m.

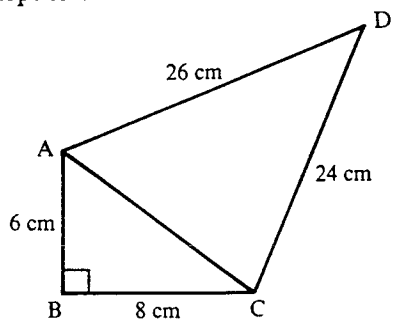
27. Calculate the length of XZ correct to 1 decimal place.



28. Find the length of EO in this rectangular pyramid:



29. (a) Find the length of diagonal AC in the figure.
(b) Hence, or otherwise, prove that AC is perpendicular to DC.



30. The volume of a cone is given by $V = \frac{1}{3}\pi r^2 h$ where r = radius and h = perpendicular height.
(a) Find the slant height s in terms of h and r and change the subject to h.
(b) Hence rewrite the volume formula in terms of r and s instead of r and h.
(c) Find the volume of a cone with radius 4 m and slant height 7 m.

Congruent triangles

16. XY = MN (given)
$\angle Y = \angle N = 90°$ (given)
ZY = NO (given)
$\therefore \triangle XYZ \equiv \triangle MNO$ (SAS)

17. $\triangle AED \equiv \triangle ABD$ (SAS)
$\therefore \triangle ABD \equiv \triangle BCD$ (SAS)

18. $\angle DAC = \angle ACB$ (alternate angles, AD||BC)
$\angle DCA = \angle BAC$ (alternate angles, AB||DC)
AC is common
$\therefore \triangle ABC \equiv \triangle ADC$ (AAS)

19. 7.4 m

20. FG = FK (given)
$\angle FGH = \angle FKJ$ (base angles of isosceles $\triangle$)
GH = KJ (given)
$\therefore \triangle FGH \equiv \triangle FKJ$ (SAS)

Similar triangles

21. $x \doteqdot 11.7, y \doteqdot 2.55$

22. (a) $\angle AOB = \angle COD$ (common)

$$\frac{OA}{OC} = \frac{OB}{OD}$$

(OA = OB and OC = OD, equal radii)
Since 2 pairs of sides are in proportion, and the included angles are equal, the triangles are similar.

(b) $\frac{OC}{OA} = \frac{CD}{AB}$

$\frac{10.1}{3.5} = \frac{CD}{2.3}$ (OA = OB)

$\frac{10.1}{3.5} \times 2.3 = CD$

$6.64 \doteqdot CD$

23. $x = 1.56, y = 3.71$

24. $\angle ABF = \angle BEC$ (alternate angles, AB || CD)
$\angle AFB = \angle EBC$ (alternate angles, AD || BC),
so $\angle BAF = \angle BCE$ (angle sum in a $\triangle$),
$\therefore \triangle ABF \,|||\, \triangle CEB$.

25. Three pairs of angles equal
$b = 3$ cm

Pythagoras' Theorem

26. $d = 1.2$, so $r = 0.6$.
$s^2 = 0.6^2 + 3.7^2$
$= 14.05$
$s = \sqrt{14.05}$
$\doteqdot 3.75$ m

27. XZ = 14.8 cm.

28. EF = 4 cm
$EO^2 = 4^2 + 7^2$
$= 65$
$EO \doteqdot 8.06$ cm

29. (a) AC = 10 cm
(b) $\angle ACD = 90°$, since $10^2 + 24^2 = 26^2$

30. (a) $s^2 = h^2 + r^2$
$s^2 - r^2 = h^2$
$\sqrt{s^2 - r^2} = h$
(b) $V = \frac{1}{3}\pi r^2 h$
$= \frac{1}{3}\pi r^2 \sqrt{s^2 - r^2}$
(c) When $r = 4, s = 7$
$V = \frac{1}{3}\pi(4)^2\sqrt{7^2 - 4^2}$
$= \frac{16\pi}{3}\sqrt{33}$
$\doteqdot 96.25$ m^3