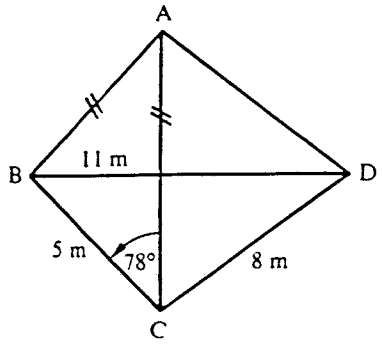
SOUTH SYDNEY HIGH SCHOOL

MATHS – EXT1 WORKSHEETS

3D TRIGONOMETRY

Exercises

37.

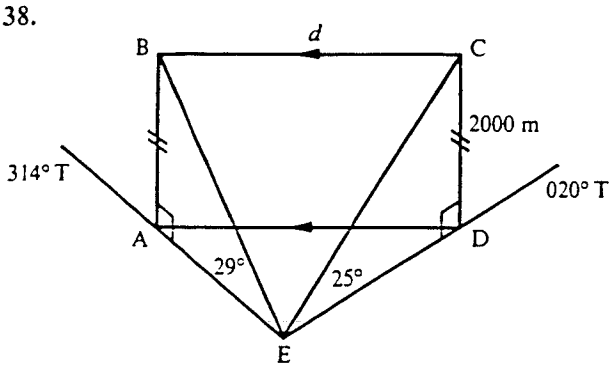


ABCD is a triangular pyramid with BC = 5 m, CD = 8 m, BD = 11 m, AB = AC and ∠ACB = 78°. Calculate:

(a) ∠BCD;

(b) length AB (to the nearest metre).

38.



An aeroplane flying at 2000 m is observed to be on a bearing of 314°T with an angle of elevation of 29°. After 1 minute it is bearing 020°T at an angle of elevation of 25°. Calculate:

(a) distance AE (to the nearest metre);

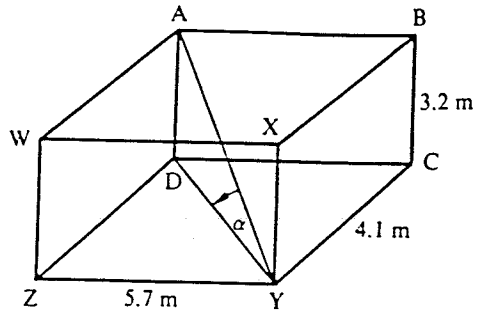
(b) distance DE (to the nearest metre);

(c) ∠AED.

(d) Hence find the distance the plane travels in that minute and its speed in km/h.

39. A cone has a base diameter of 20 cm and a perpendicular height of 15 cm. Find the vertical angle at the top of the cone.

40.



Calculate the value of α in degrees and minutes.

37. (a) $\angle BCD = 113°35'$ (cosine rule)
(b) $AB = 12$ m (sine rule)

38. (a) In $\triangle ABE$

$$\tan 29° = \frac{2000}{AE},$$

$$\therefore AE = \frac{2000}{\tan 29°}$$

$$\doteqdot 3608 \text{ m.}$$

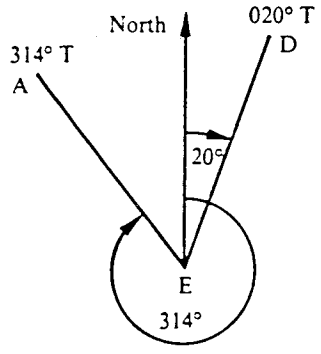
(b) In $\triangle CED$

$$\tan 25° = \frac{2000}{DE},$$

$$\therefore DE = \frac{2000}{\tan 25°}$$

$$\doteqdot 4289 \text{ m.}$$

(c)



In $\triangle ADE$

$\angle AED = (360° - 314°) + 20°$

$= 66°$

(d) In $\triangle ADE$

$$c^2 = a^2 + b^2 - 2ab\cos C,$$

$$\therefore AD^2 = 3608^2 + 4289^2 - 2(3608)(4289)\cos 66°$$

$$= 18\,824\,920$$

$AD = 4338.8$

$AD = BC,$

$\therefore$ the plane travels 4338.8 m in 1 minute.

Speed $= 4338.8$ m/min

$= 4.3388$ km/min

$= 4.3388 \times 60$ km/h

$= 260$ km/h

39. $67°23'$

40. $ZD = YC = 4.1$ m

In $\triangle ZDY$, by Pythagoras' Theorem,

$$DY = \sqrt{4.1^2 + 5.7^2}$$

$\doteqdot 7$ m.

In $\triangle ADY$

$$\tan\alpha = \frac{AD}{DY}$$

$$= \frac{3.2}{7}$$

$$= 0.4557,$$

$\therefore \alpha = 24°30'.$