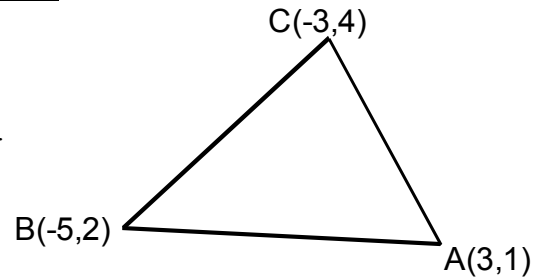


Angle between Vectors

1. A triangle has vertices A(3,1), B(-5,2) and C(-3,4).
Calculate the size of angle BCA.

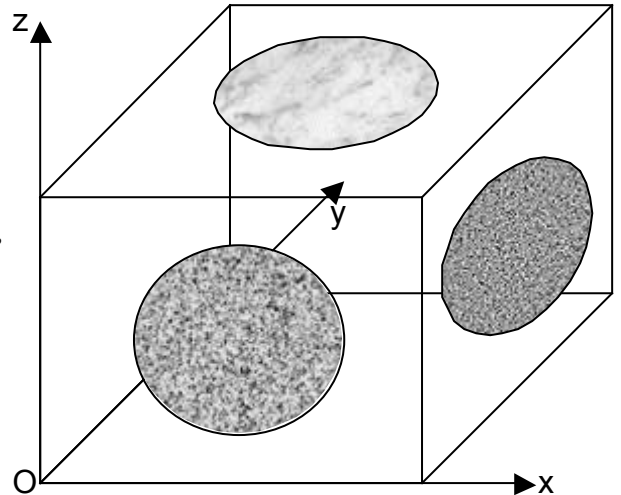


2. A triangle has vertices P(2,1,-4), Q(3,3,5) and R(0,1,5).
Calculate the size of angle PQR.

3. A box in the shape of a cuboid is designed with circles of different sizes on each face.

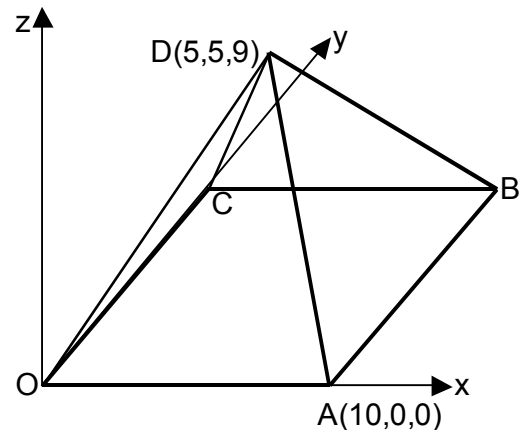
The diagram shows 3 of the circles, where the origin represents one of the corners of the cuboid. The centres of the circles are A(6,0,7), B(12,5,6) and C(7,5,14).

Find the size of angle ABC.



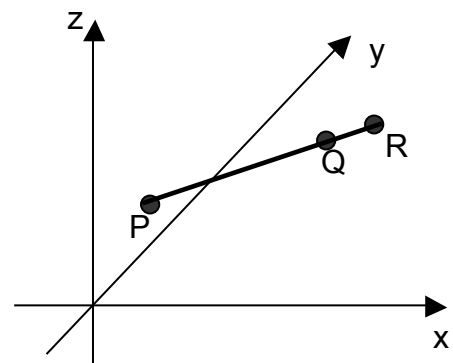
4. The diagram shows a square based pyramid of height 8 units.
Square OABC has side of length 10 units.
The coordinates of A and D are (10,0,0) and (5,5,9).
C lies on the y-axis.

- (a) Write down the coordinates of B.
(b) Calculate the size of angle ADB.

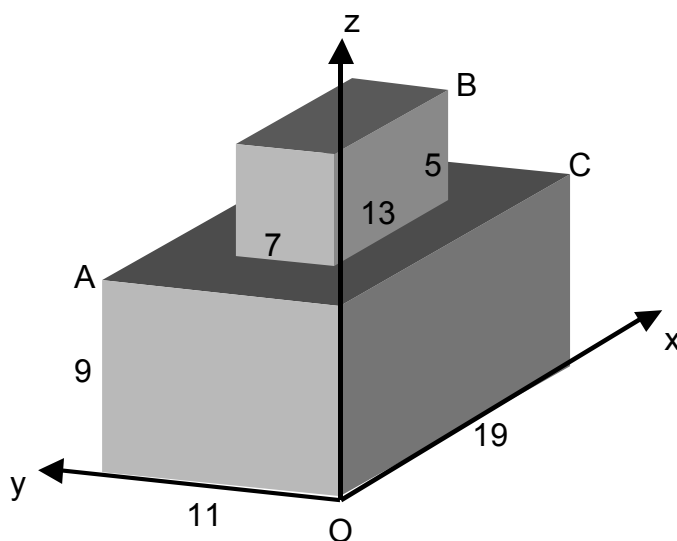


5. In the diagram opposite P(-1,3,2) and Q(5,0,5).
represent points on a road.
The road is extended to the point R such that
 $\overrightarrow{PR} = \frac{4}{3} \overrightarrow{PQ}$.

- (a) Find the coordinates of R.
(b) Roads from P and R are built to meet at the point S(-2,2,5).
Calculate the size of angle PSR.

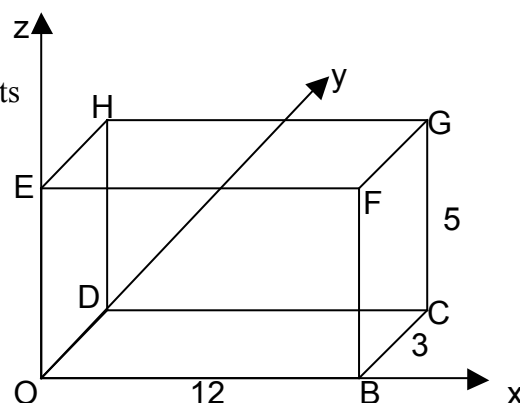


6. A cuboid measuring 13 cm by 5 cm by 7 cm is placed centrally on top of another cuboid measuring 19 cm by 11 cm by 9 cm. Coordinates axes are taken as shown.



- (a) The point A has coordinates (0,11,9) and C has coordinates (19,0,9).
Write down the coordinates of B.
(b) Calculate the size of angle ABC.

7. The diagram opposite shows a cuboid with measurements as shown.



- (a) Write down the coordinates of C and H.
(b) Find the size of angle HCO.

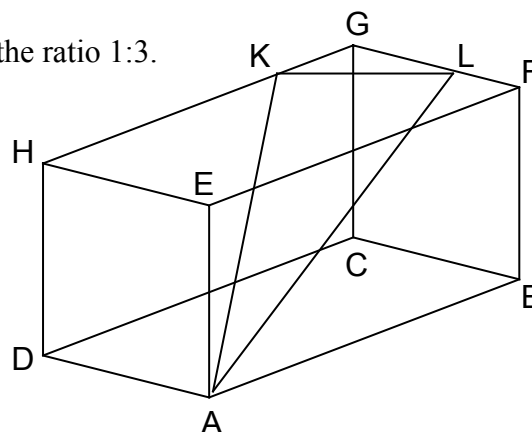
8. PQRS is a quadrilateral with vertices P((-2,-1,-4), Q(1,5,-7), R(7,8,5) and S(7,2,17).

- (a) T divides PR in the ratio 5:4. Find the coordinates of T.
(b) Show that Q, T and S are collinear.
(c) Calculate the size of the acute angle between the diagonals of PQRS.

9. ABCDEFGH is a cuboid.

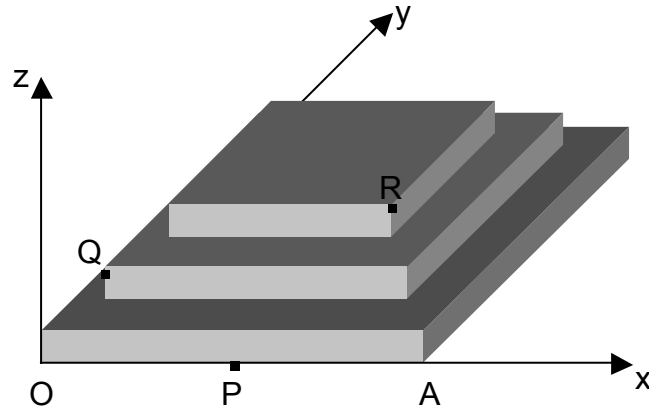
K divides HG in the ratio 2:1 and L divides FG in the ratio 1:3.

$$\overrightarrow{AB} = \begin{pmatrix} 3 \\ 6 \\ 3 \end{pmatrix} \quad \overrightarrow{AD} = \begin{pmatrix} -8 \\ 4 \\ 4 \end{pmatrix} \quad \overrightarrow{AE} = \begin{pmatrix} 1 \\ -3 \\ 5 \end{pmatrix}.$$

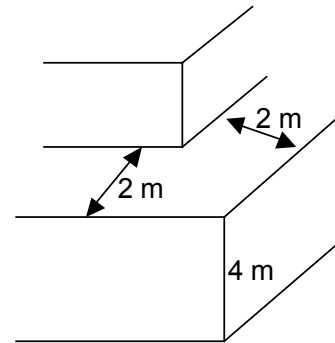


- (a) Calculate the components of $\overrightarrow{AK}$ and $\overrightarrow{AL}$
(b) Calculate the size of angle KAL.

10. The first three levels of a stepped pyramid with a square base are shown



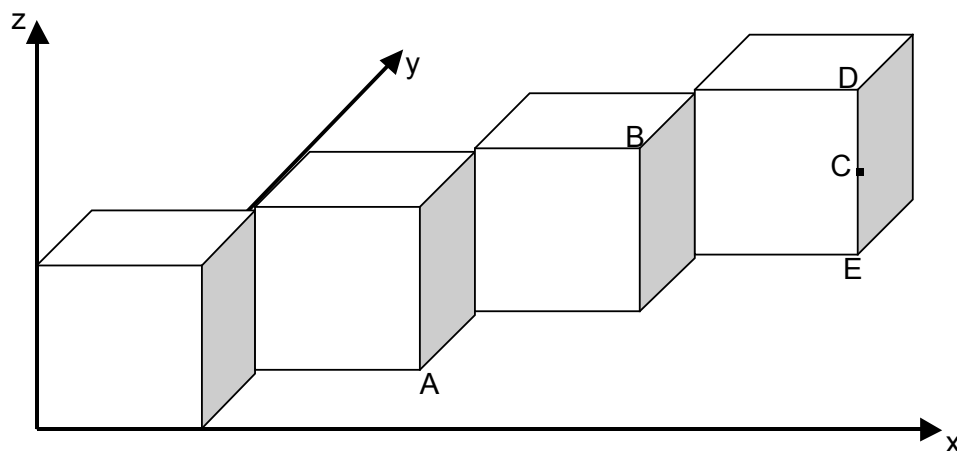
Each level is a square based cuboid of height 4 m.
The shaded parts indicate the steps which have a width of 2 m.



With coordinate axes as shown the coordinates of P and A are $(16,0,0)$ and $(32,0,0)$.

- Find the coordinates of Q and R.
- Find the size of angle QPR.

11. The diagram below shows 4 identical cubes placed edge to edge at right angles on a coordinate diagram. The cubes have length of side of 4 units. C is the midpoint of side DE.



- A has coordinates $(8,4,0)$. Write down the coordinates of B and C.
- Calculate the size of angle ABC.