GEOMETRY AND TRIGONOMETRIC CALCULATIONS
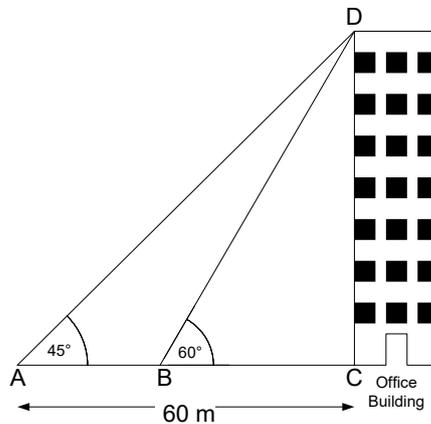
Trigonometry Problems

1   Bill and Ben used a clinometer to measure the angle from where they were standing to the top of a tall building. The measured the distance from where they were standing to the foot of the building. The results are shown in the diagram below.


    i   What is the height of the building?

    ii   What is the distance from A to B?

2   A ski lift is installed in the Alps to allow skiers to rise from an elevation of 2,858 m to 3103 m. The wire running along which the skiers will be carried is 450m long. What is the angle of elevation of the skiers on the lift?

3   AED is a straight line. AEC is a right angle. AB and EC are parallel.

    How long is CE?
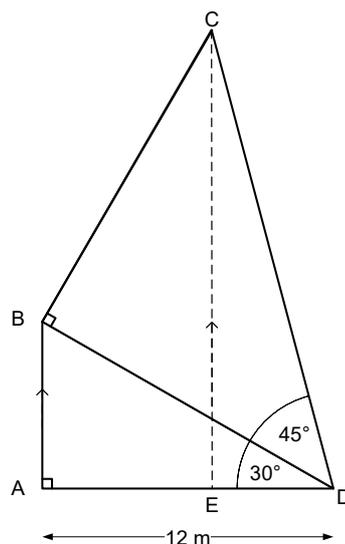
Sine and Cosine Graphs

1   Complete the Sine Graph below.   2   Complete the Cosine Graph below.
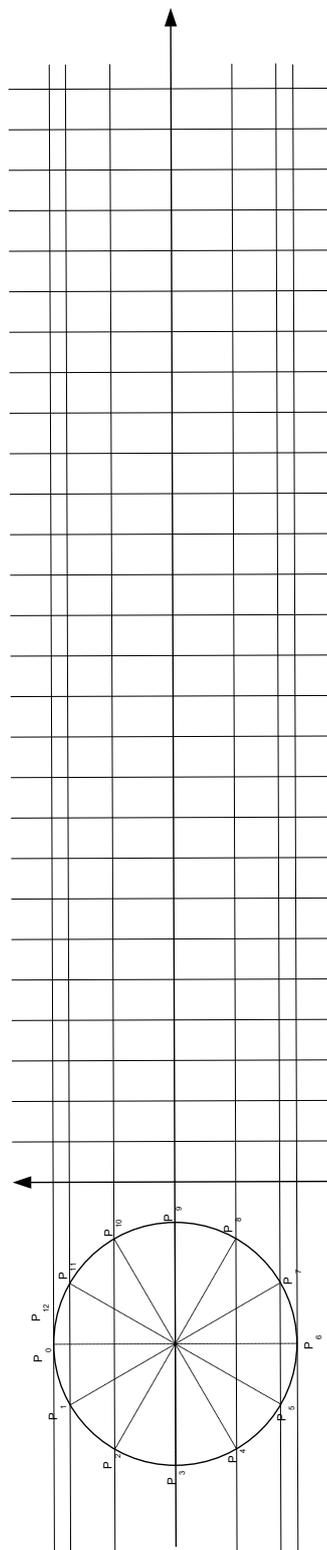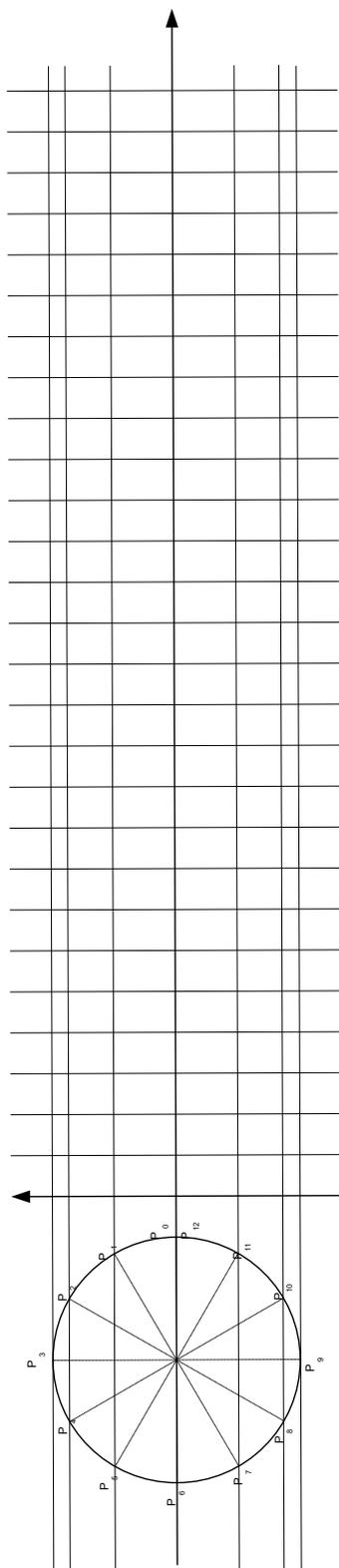
3   Fill in the blanks in the text below.

Sine graphs are _____ which means that they have a pattern that repeats over and again. One cycle takes 360° (as in the circle) or 2π radians. Then the pattern _____ .

P_0 on a sine wave starts on the x axis which is on the _____ of the circle. There are _____ plotted in one cycle of the graph so each one is _____°.

Cosine graphs are _____ which means that they have a pattern that repeats over and again. One cycle takes 360° (as in the circle) or 2π radians. Then the pattern _____ .

P_0 on a cosine wave starts at the top of the circle. There are _____ points plotted in one cycle of the graph so each one is _____°.

If we were to plot a cosine wave and a sine wave on the same axis, the cosine wave would _____ the sine wave by 90° or $\frac{\pi}{2}$radians.

Periodic functions are said to _____ through their position at rest.

WORDS TO HELP YOU:

REPEATS	OSCILLATE	LEAD
PERIODIC	TWELVE	THIRTY
SIXTY	NINETY	RADIANS

4   Go on www.geogebra.org and type in f(x)=tan(x).
   a. What is the period of the graph?
   b. If you drew the line x=90 and x=270, what would the name of these lines be?
   c. Sketch the graph in your book noting the position of asymptotes.

5   Solve $\sin \theta = 0.5$ for all values $-180 \leq \theta \leq 360$

The calculator always gives the principal value which is in the range $-90 \leq \theta \leq 90$. This is not the complete solution.
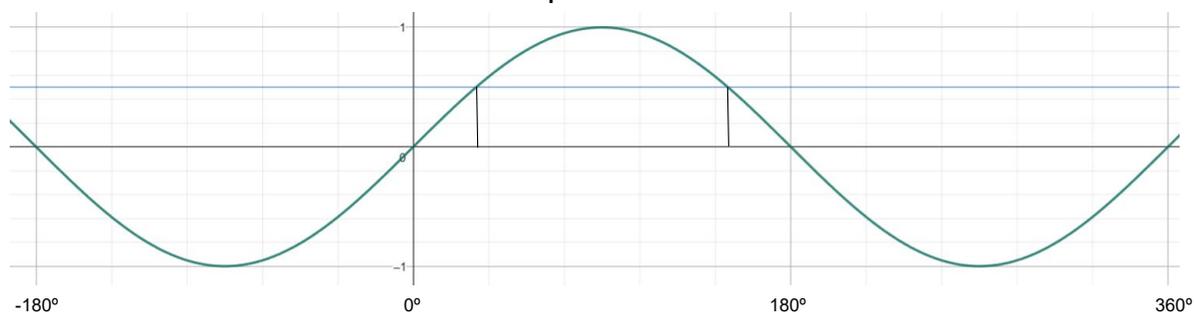
NB   To find the second angle, find the principal angle and then perform the following calculations depending on the trigonometric function:

$$\sin^{-1} \theta \qquad\qquad \sin^{-1}(180 - \theta)$$
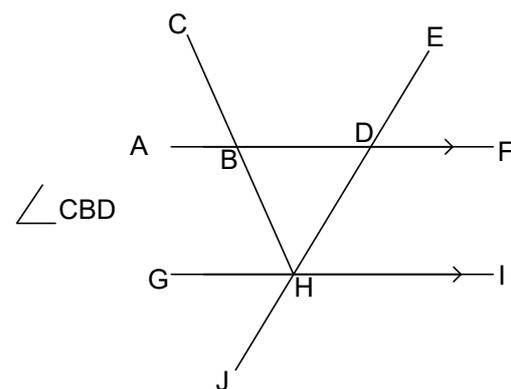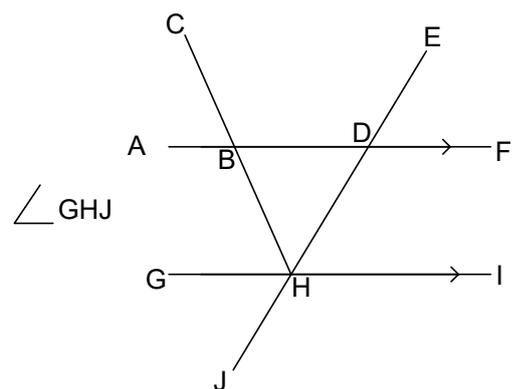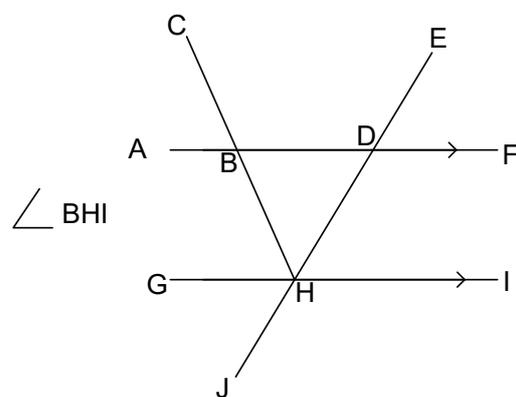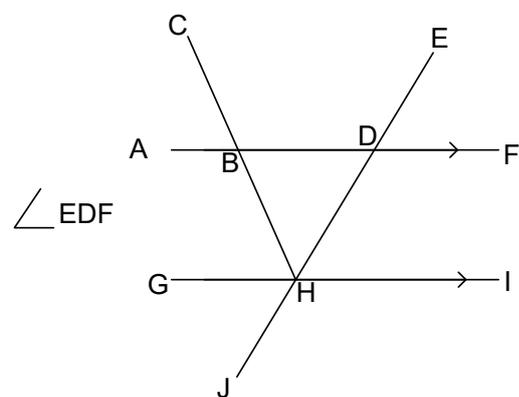
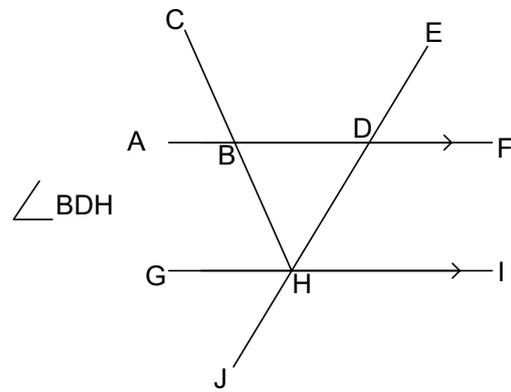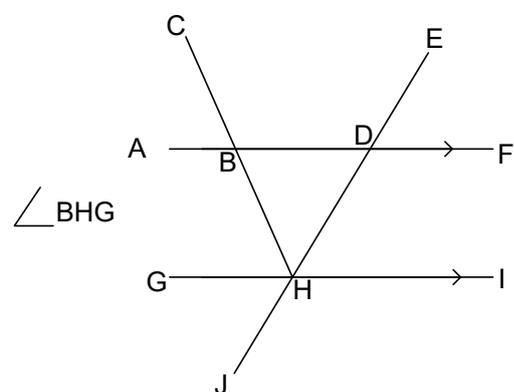$$\cos^{-1} \theta \qquad\qquad \cos^{-1}(360 - \theta)$$

$$\tan^{-1} \theta \qquad\qquad \tan^{-1}(\theta + 180)$$

To find further angles, add 360 to the angles you have had to find already.

6   Find all the angles for the following between $-180 \leq \theta \leq 540$.

    a. $\tan \theta = 0.7$
    b. $\cos \theta = -0.2$
    c. $\sin \theta = 0.42$
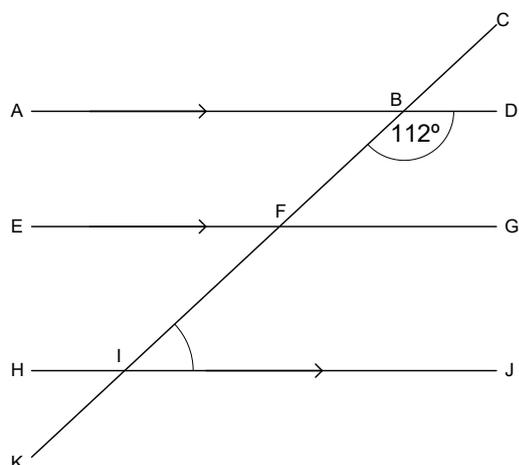   d. $\cos \theta = 0.14$
    e. $\tan \theta = -1.4$

Naming Angles

Mark the following angles onto the diagrams below.

∠ BHG

∠ BDH

∠ EDF

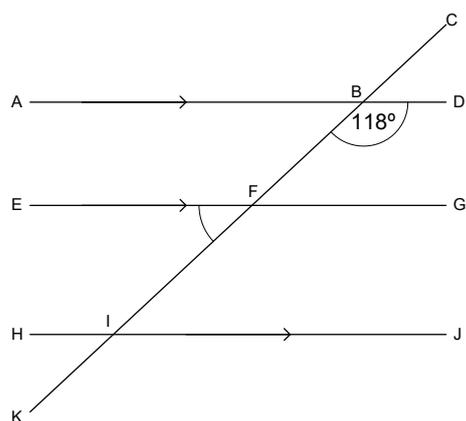∠ BHI

∠ GHJ

∠ CBD

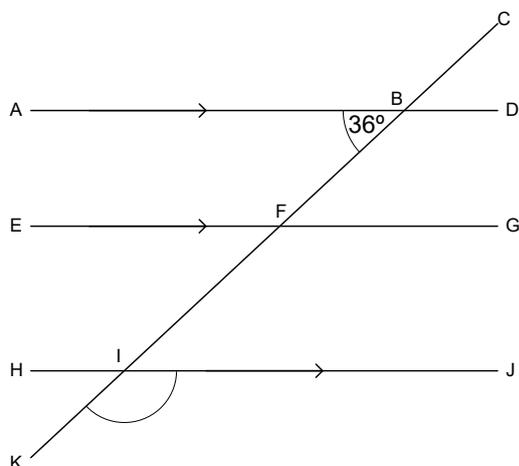# Parallel Lines

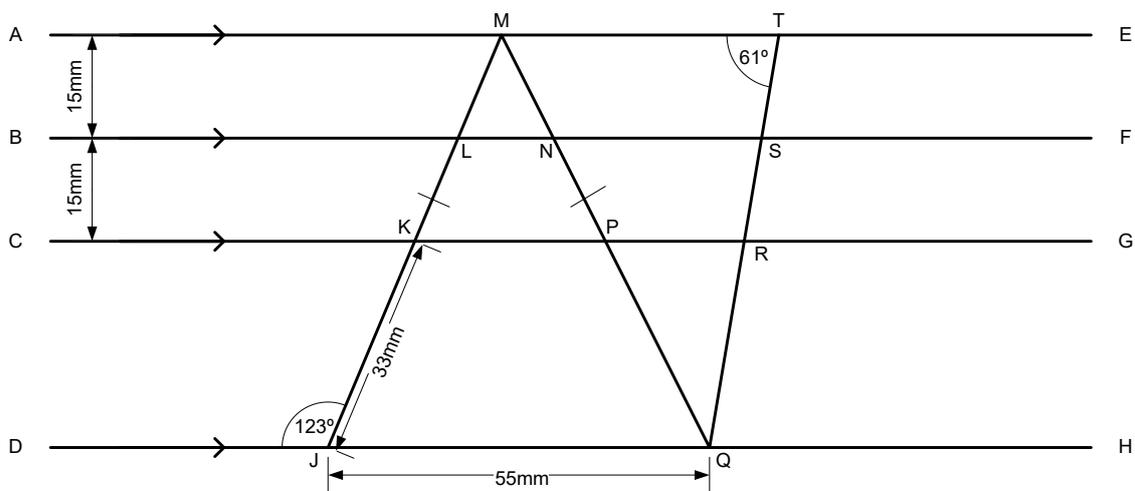1   Find angle FIJ. Give reasons.

2   Find angle EFI. Give reasons.

3   Find angle KIJ. Give reasons.

4

JMQ is an isosceles triangle.

AE, BF, CG and DH are all straight lines that are parallel to one another.

Angle DJK is 123°. Angle MTS is 61°.

Calculate all the angles and give reasons.

Find the areas of JKPQ and NPRS.