Lesson 5

GCSE Mathematics

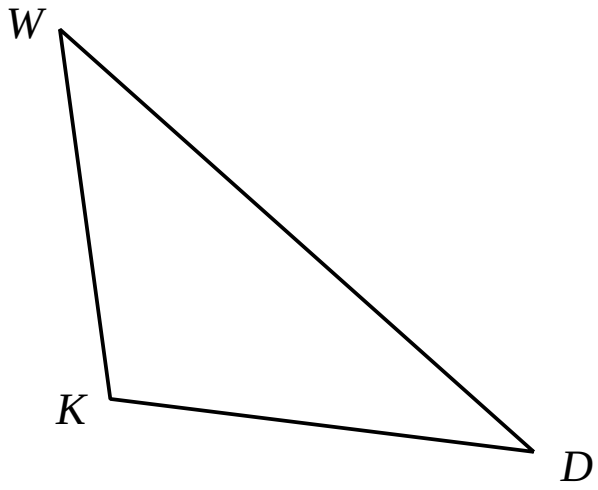
Non-Right Angled Trigonometry

5.1 Alphabet Soup Cosine Rule

In the previous Lesson, all our triangles were labelled *A*, *B* and *C* and every problem was arranged so that length *c* was to be found.
Often different lettering is used, as the next example illustrates.

5.2 Example

(i) On $\triangle WKD$, place the letters *w*, *k* and *d*.



(ii) On $\triangle WKD$, mark on that;

- *WD* is of length 16.3 cm.
- *WK* is of length 11.6 cm.
- $\angle W$ is 34°.
- *KD* is the length *x*, which is to be found.

(iii) Mark the *included* angle with a star, *.

(iv) For $\triangle WKD$, write down the cosine rule for w^2, in terms of *k*, *d* and *W*.

(v) Use the cosine rule to find the length of *x*.

(vi) Find the area of $\triangle WKD$.

5.3 Exercise

Question 1

For $\triangle HMS$, write down the cosine rule for h^2, in terms of m, s and H.

Question 2

For $\triangle BAT$, write down the cosine rule for a^2, in terms of b, t and A.

Question 3

For $\triangle MAD$, write down the cosine rule for m^2.

Question 4

For $\triangle ABC$, write down the cosine rule for;

(i) c^2

(ii) b^2

(iii) a^2

Question 5

$\triangle ZEN$ has $EN = 4.3$ cm, $ZE = 6.5$ cm, and $\angle E = 66°$.

(i) Sketch, roughly, $\triangle ZEN$ marking on the two known lengths & included angle.

(ii) Write down the cosine rule for e^2.

(iii) Find the length of side ZN, accurate to 2 decimal places.

(iv) Find the area of $\triangle ZEN$, accurate to 2 decimal places.

Question 6

$\triangle ICU$ has $IU = 10.2$ cm, $IC = 3.8$ cm, and $\angle I = 41.5°$.

(i) Sketch, roughly, $\triangle ICU$ marking on the two known lengths & included angle.

(ii) Write down the cosine rule for i^2.

(iii) Find the length of side CU, clearly stating the units of your answer.

(iv) Find the area of $\triangle ICU$, clearly stating the units of your answer.

Question 7

$\triangle OMG$ has $OM = 5.3$ km, $MG = 7.9$ km, and $\angle M = 127°$.

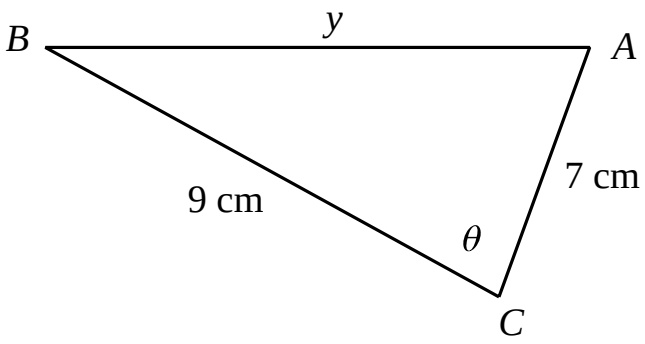
(i) Sketch, roughly, $\triangle OMG$ marking on the two known lengths & included angle.

(ii) Write down the cosine rule for m^2.

(iii) Find the length of side OG, clearly stating the units of your answer.

(iv) Find the area of $\triangle OMG$, clearly stating the units of your answer.

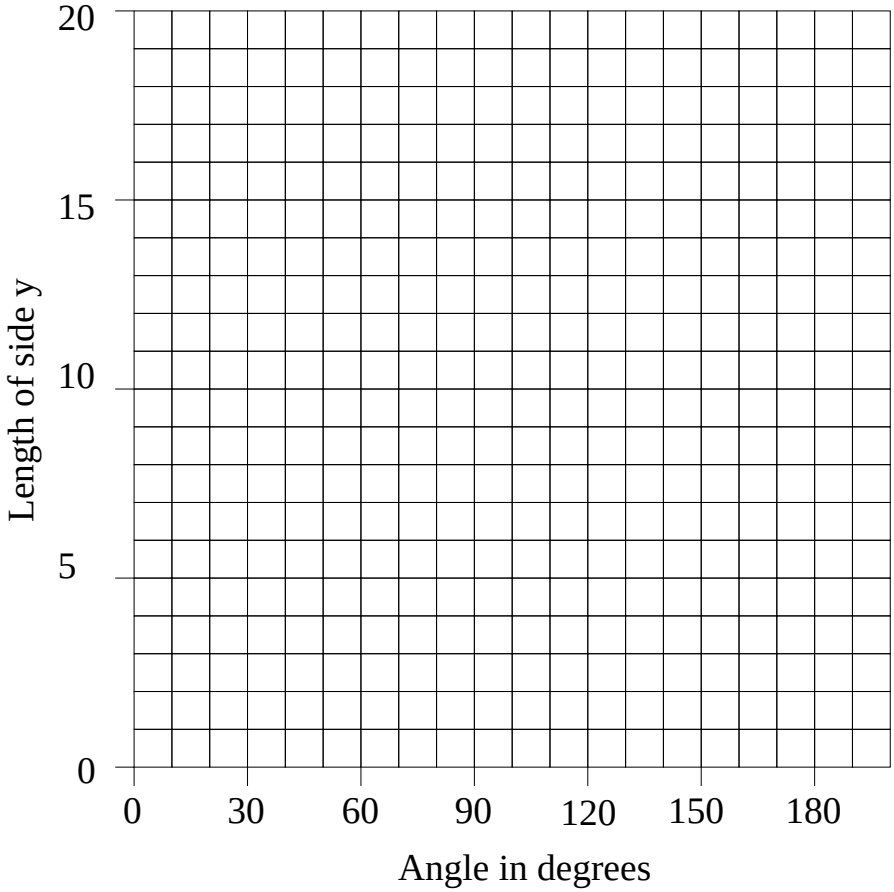
Question 8



(i) Work out the length y for the values of θ given in the table below;

θ	0°	30°	60°	90°	120°	150°	180°
y							

(ii) Plot a graph of your results with θ on the x-axis and length y on the y-axis



(iii) What happens as θ continues to increase beyond 180° and up to 360° ?