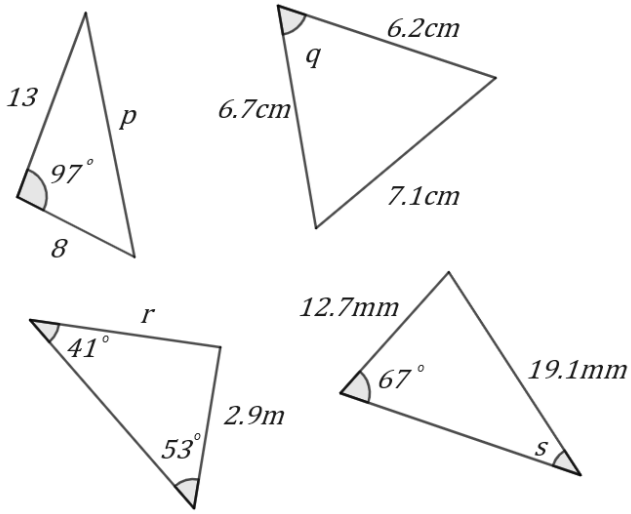
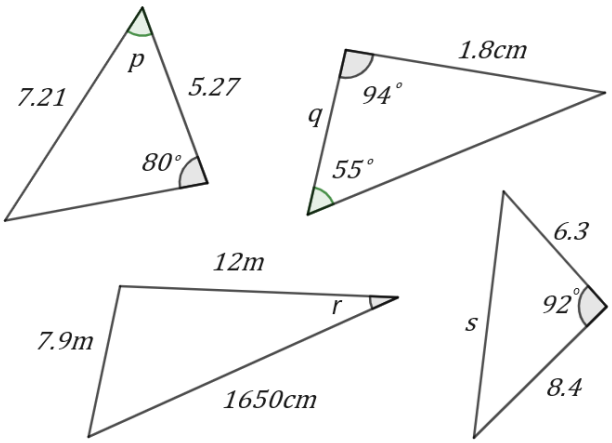
Sine and Cosine Rule – Anything Goes!
www.m4ths.com – Steve Blades!

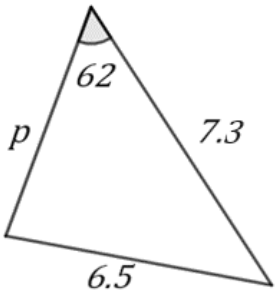
(1) Find the value of p, q, r and s in each triangle shown. Give each answer to 3SF.



(2) Find the value of p, q, r and s in each triangle shown. Give each answer to 1dp.

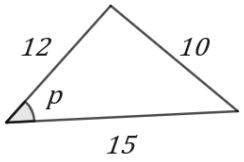


(3) Find the value of p in the diagram below.

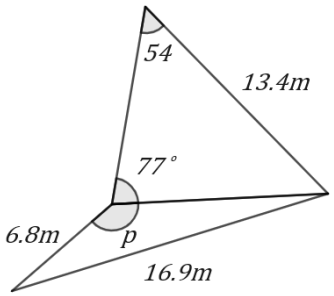


(4) In $\Delta\, ABC, < BAC = 71^o,\ AB = 11.6cm$ and $BC = 11cm$.
(a) Use the ambiguous case of the Sine Rule to show that $< BCA = 85.6^o$ to 1dp **OR** $< BCA = 94.4^o$ to 1dp.
(b) Given that $< BCA$ is an obtuse angle, find AC to 3 SF.

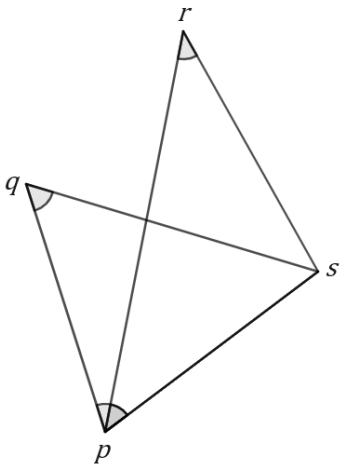
(5) Show that the exact value of $\cos p = \frac{269}{360}$ for the triangle below.



(6) Find the size of angle p in the diagram below.

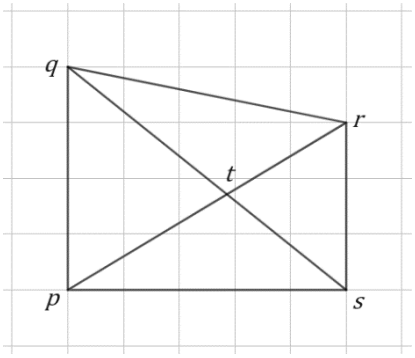


(7) The diagram below shows the pentagon $PQRS$.



$pr = 12.9cm, rs = 8.4cm, < prs = 40^o,$
$qs = 9.1cm$, and $< pqs = 55^0$.
Find the size of $< rpq$.

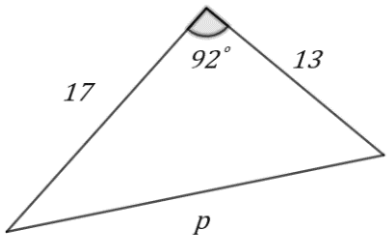
(8) The diagram below shows the quadrilateral $pqrs$. The point t is the point where the diagonals pr and qs intersect.



Use trigonometry to find the perimeter of $\Delta\, ptq$.

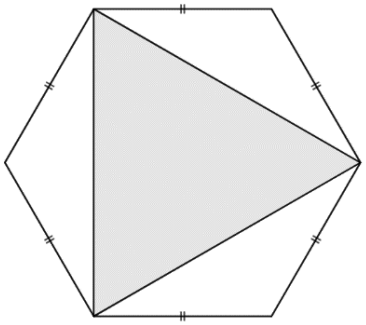
(9) In $\Delta\, ABC,\ < ABC = 30^o\ \ AC = 4cm$ and $BC = 6cm$. Find the exact value of $\sin < BAC$ without using a calculator.

(10) The diagram below shows a triangle. Both lengths **and** the angle given are correct the nearest integer.



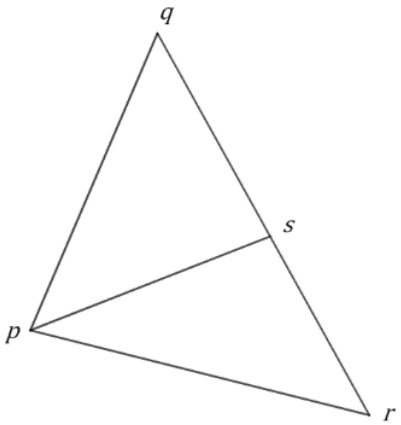
Find the upper bound of p correct to 3dp.

(11) The diagram shows a shaded triangle drawn inside an unshaded polygon. The vertices of the triangle are shared with the 3 of the vertices of the polygon.



The perimeter of the triangle is 3.
Show that the perimeter of the polygon is $2\sqrt{3}$

(12) The diagram below shows the triangle pqr. The point s lies on qr. The line ps is a straight line.



Given that $pr = 8.25,\ pq = 7.62, qr = 10.3$ and $ps = 6.08$, find $< qsp$ to 3SF.

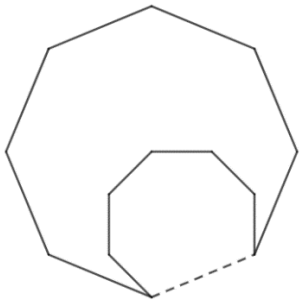
(13) A parallelogram has side lengths $5cm$ and $7cm$. Given that the shortest diagonal of the parallelogram is $4\sqrt{2}cm$, find the size of the largest angle in the parallelogram.

(14) A triangle has side lengths p, q and r and angles P, Q and R. Angle P is opposite side p, angle Q is opposite side q and angle R is opposite side r.
Given that $\sin < P = \frac{1}{3}$, $\sin < Q = 0.2$ & $q < p < r$
(a) Without using a calculator, write p in terms of q.
(b) Explain why $r < \frac{8}{3}q$
(c) Without using a calculator, explain why R is an obtuse angle.

(15) In $\Delta PQR, < QPR = 42^0, QR = 23.2cm$ and $PQ = 25.7$.
Find the minimum possible perimeter of the triangle.

(16) Jim leaves is home at midday and walks at a steady speed of $5km/h$ from his home on a bearing of 300^0 for $14km$. He then stops and **immediately** walks on a bearing of 100^o with the same speed as before. Find what time he is due north of his house. Give your answer to the nearest minute.

(17) The diagram below shows a wire structure. The structure consists of 13 straight lengths of wire. The 7 longer lengths of wire form part of a regular octagon. The 6 shorter lengths are all $1cm$ and form part of a second regular octagon. The dotted line shows the missing side of the larger octagon which also spans 2 of the vertices of the smaller octagon.



Find the total length of the wire used in the structure.

(18)* A triangle is drawn on a pair of coordinates axes. The vertices of the triangle are $(-4, 3), (0, 2)$ and $(1, -3)$. Given that x is the obtuse angle in the triangle:
(a) Find the exact value of $\cos x$.
(b) Hence, show that $\sin x = 0.8989$ correct to 4SF.
(c) Find the area of the triangle.

(19) A triangle has one side length of $6cm$ and one of $8.4cm$. Given that the area of the triangle is $22.3cm^2$, find maximum possible the perimeter of the triangle to 3SF.