

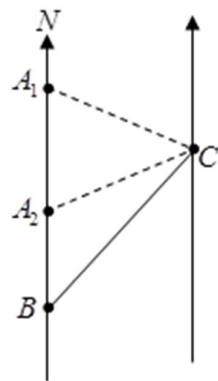


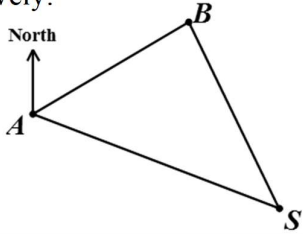
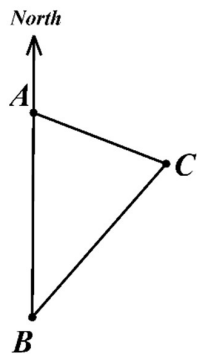
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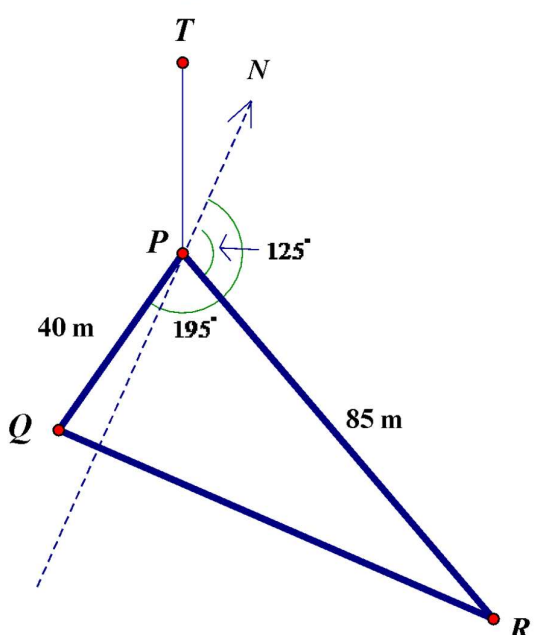
Topical Revision Worksheet 8

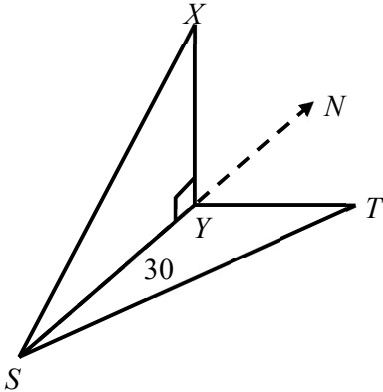
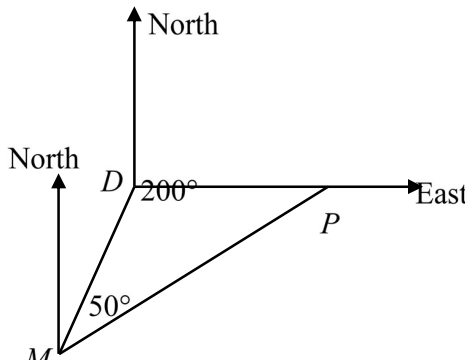
Topic: Trigonometry EM

Question 1 [2008 EOY, Q17]	marks
The diagram below shows the position of three locations A, B and C with respect to a reference point O. The bearings of A, B and C from O are 050°, 135° and 240° respectively. It is also given that $OA = 120$ m and $OB = 150$ m. (i) Find the bearing of B from A. Answer: 175.6°	[3]
(ii) If the bearing of B from C is 100°, calculate the length of OC. Answer: 133.8 m	[3]
(iii) A mast stands vertically at B such that the angle of elevation of the top of the mast from O is 62°. Find the height of the mast. Answer: 282.1 m	[2]
Question 2 [2009 EOY, Q14]	marks
The diagram below shows three circular fields with centres P, Q and R tangential to one another. The radii of the three fields are 2 m, 4 m and x m respectively and $\angle PRQ = 60^\circ$.	[3]

(i)	Form an equation in x and show that it reduces to $x^2 + 6x - 24 = 0$.	
(ii)	Solve the equation, giving your answer in surd form and find the exact area of triangle PQR . Answer: $= 8\sqrt{3} \text{ m}^2$	[4]
(iii)	A pole of y m stands at P . A boy walks from R to Q . Given that the maximum angle of elevation of the top of the pole during the walk is 60° , find y . Answer: $= \frac{48}{1 + \sqrt{33}}$ or 7.12 m	[3]
Question 3 [2010 EOY, Q9]		marks
Three points A, B and C on level ground are such that A is due north of B, $BC = 20$ km, the bearing of C from B is 042° and $AC = 16$ km. (i) Find the possible distances of A from B. Answer: $\frac{BA_1}{\sin 81.24^\circ} = \frac{16}{\sin 42^\circ} \Rightarrow BA_1 = 23.6 \text{ km (3 s.f.)}$ $\frac{BA_2}{\sin 14.76^\circ} = \frac{16}{\sin 42^\circ} \Rightarrow BA_2 = 6.09 \text{ km (3 s.f.)}$		 [5]
(ii)	Taking the shorter distance between A and B , determine the bearing of A from C . Answer: 236.8°	[2]
Question 4 [2011 EOY, Q7]		marks
The variables x and y are related by the equation $\sqrt{2^y} = ay + \frac{b}{\sqrt{x}}$. A straight line passes through $(5, 7)$ is obtained when $\sqrt{2^y x}$ is plotted against $y\sqrt{x}$. (i) Given that the gradient of this line is 2, calculate the value of a and of b. Answer: $a = \text{gradient} = 2$ and $b = -3$		[3]
(ii)	Given that this line also passes through $(k, 13)$, find the value of k . Answer: $k = 8$	[2]

Question 5 [2011 EOY, Q15]	marks
In the diagram A, B and S represent three points in the sea. B is 3 km from A on a bearing of 060°. The bearings of S from A and B are 110° and 155° respectively.  (i) Calculate the distance AS. Answer: 4.23km	[3]
(ii) A ship at S sails directly to A at a steady speed of 2 kmh^{-1}. After 40 minutes, the ship is at T, a point on AS. (a) Calculate the distance BT. Answer: 2.49km	[3]
(b) Find the bearing of B from T. Answer: 357.3°	[3]
(iii) A hot air balloon, H, is lowering at a point 600 m vertically above B. Calculate the greatest angle of elevation of H from an observer on the ship as the ship sails from S to A. Answer: 14.6°	[2]
Question 6 [2012 EOY Q13]	marks
ABC represents a horizontal triangular field such that A is due north of B, $AB = 240 \text{ m}$, $AC = 180 \text{ m}$ and the bearing of C from A is 110°.  (i) Find the distance BC. Answer: 246 m	[3]
(ii) Find the bearing of C from B. Answer: 043.5°.	[3]
(iii) A vertical tree, of height 25 m, is planted at C. A farmer walks along a footpath from A to B. Find the maximum angle of elevation of the top of the tree from the farmer during this walk. You may ignore the height of the farmer. Answer: 8.4°	[4]

Question 7 [2013 EOY, Q12]	marks
In the diagram, PQR represents a horizontal triangular field such that $PR = 85$ m and $PQ = 40$ m. The bearing of R from P and the bearing of Q from P is 125° and 195° respectively. (i) Calculate the distance from Q to R. Answer: 80.6m 	[2]
(ii) Calculate the area of the triangular field PQR. Answer: 1600 m^2	[2]
(iii) Calculate the shortest distance from P to the road QR. Answer: 39.6m	[2]
TP represents a building at the corner P. Given that the angle of depression of the top of the building T to the corner R is 20°, (iv) calculate the height of the building TP. Answer: 30.9m	[2]
A man walks along the road from Q to R, (v) calculate the greatest angle of elevation of the top of the building. Answer: 38.0°	[2]

Question 8 [2014 EOY, Q14]	marks
Three points, S, Y and T are on level ground. Y is the foot of a vertical flagpole XY, and S is 30 m due south of Y. (i) The angle of elevation of X from S is 25°. Calculate the height of the flagpole. Answer: 14.0m 	[2]
(ii) The bearing of T from S and the bearing of T from Y are 042° and 075° respectively, calculate the distance ST. Answer: 53.2m	[3]
(iii) A man is standing at the midpoint of ST. Calculate the angle of elevation of X from the man. Answer: 34.3°	[5]
Question 9 [2015 EOY, Q11]	marks
A man, at point M, is 80 metres at a bearing of 200° from an observation deck, D, which stands 25 metres tall. He begins to walk to a point P which is due East of D at a bearing of 050°. Ignoring the man's height, calculate (i) the angle of elevation of the top of the deck from the man at M, Answer: $=17.4^\circ$ (1 d.p.) 	[2]
(ii) the distance he walks when the angle of elevation of the top of the deck from his position is the greatest, and Answer: $=40\sqrt{3}$ or 69.3 (3 s.f.) m	[3]
(iii) the distance DP. Answer: 62.2m	[2]