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The following diagram shows triangle . , and angle . Calculate the area of triangle, giving your answer in m2.Label the sides of the triangleConvert the sides to be in the same unitsUse the area of a triangle formula, The area is 0.169 m2 (to 3 s.f.)Page 2Find the area of the triangle below.The area of a triangle can be found using the formula The three side lengths are known , but we need to find an angle in order to calculate the areaBecause we know all three sides, any of the angles could be foundFind angle ABC using the cosine ruleCosine Rule: , where is the angle opposite side Rearrange to make the subjectUse your calculator to find the value of Use the cos-1 button on your calculator to find the value of Now we can find the area of the triangle using the formula and angle ABC as the known anglePage 3Exam code: 83004 hours47 questions1a2 marks is a triangle.Work out the area of triangle . Give your answer correct to 3 significant figures.1b3 marksWork out the length of the side . Give your answer correct to 3 significant figures.Did this page help you?23 marksCalculate the length of . Give your answer correct to 3 significant figures.Did this page help you?31 markHere is a triangle.Circle the correct equation.Did this page help you?41 markHere is a triangle.Leah tries to use the sine rule to work out the size of angle . Here are the first two lines of her working.What error has she made in this working?Did this page help you?53 marksWork out the size of angle degrees Did this page help you?64 marksA ship sails from to and then from to. is 12 miles from , on a bearing of 080° is 28 miles from , on a bearing of 155°Work out the direct distance from to. Did this page help you?74 marks and are triangles.The area of is 80.5 cm2 Work out the area of. Give your answer to 3 significant figures. cm2 Did this page help you?8a3 marksLiz and Tia are walking towards a shop along different straight paths.The diagram shows their positions at 2 pmAssume they walk at the same speed.Who will arrive at the shop first? You must show your working.8b1 markIn fact, Liz walks at a faster speed than Tia.How does this affect the answer to part (a)?Did this page help you?93 marksHere is a triangle.Work out the length cmDid this page help you?103 marksIn the triangle, angle is obtuse.Work out the size of angle degreesDid this page help you?11a2 marksThe diagram shows parallelogram . Work out the area of the parallelogram. Give your answer correct to 3 significant figures. 11b3 marksWork out the length of the diagonal of the parallelogram. Give your answer correct to 3 significant figures. Did this page help you?123 marksThe diagram shows triangle . Calculate the length of . Give your answer correct to 3 significant figures. kg14b1 markWhy might the answer to partbe unreliable?Did this page help you?15a4 marksADC and ACD are triangles.Show that AC = 13.0 cm, correct to 3 significant figures.15b3 marksCalculate BC..... cmDid this page help you?163 marksCalculate length DF in this triangle. cmDid this page help you?174 marksCalculate angle ACB in this triangle.Did this page help you?184 marksT is a radar tower. A and B are two aircraft. At 3pmaircraft A is 3250km from T on a bearing of 015°aircraft B is 4960km from T on a bearing of 057° Calculate the distance that was between aircraft A and aircraft B at 3pm. kmDid this page help you?15 marksWork out the length of . Give your answer correct to 3 significant figures.Did this page help you?25 marksA triangle.Calculate the area of triangle . Give your answer correct to significant figures.Did this page help you?25 marksThe diagram shows triangle . Calculate the length of . Give your answer correct to 3 significant figures.Did this page help you?45 marksA triangle. is a point on . Angle = 45°Angle = 80° = 7.4cm = 5.8 cmWork out the length of . Give your answer correct to 3 significant figures.Did this page help you?55 marksis a triangle.= 8.4m Angle = 40°The area of the triangle = 100 m2.Work out the length of . Give your answer correct to 3 significant figures. You must show all your working.Did this page help you?6a4 marksIn triangle , = 8.7 cm = 5.2 cmAngle = 32°Assuming that angle is an acute angle,calculate the area of triangle .Give your answer correct to 3 significant figures.6b1 markIf you did not know that angle is an acute angle, what effect would this have on your calculation of the area of triangle ?Did this page help you?73 marksThe diagram shows the triangle .Angle The area of triangle Show that Did this page help you?84 marksis an isosceles triangle.Work out the area of the triangle. Give your answer correct to 3 significant figures.Did this page help you?95 marksA shape is made by joining triangle to a semicircle with diameter . Work out the total area of the shape.Did this page help you?10a3 marksHere is a triangular sail.Vicky needs to buy waterproofing liquid for the sail.She will put 3 coats of liquid on each side of the sail. A litre of liquid covers 8.5 square metres of sail.How many 1-litre bottles of liquid does Vicky need?10b5 marksAnother sail is joined to the first sail as shown. is an acute angle.Work out the size of angle .Did this page help you?113 marksHere is a triangle The length and the angles are each given correct to 2 significant figures. Calculate the upper bound for the length . Give your answer correct to one decimal place. Show your working clearly. Did this page help you?126 marksHere is a quadrilateral . Angle is acute.Work out the size of angle . Give your answer correct to decimal place.Did this page help you?136 marksThe diagram shows triangle ABC with D on AC and E on AB. DE is a straight line.AD = 28 m, AE = 41 m, DE = 22 m and BC = 64 m. Calculate the length CD. cmDid this page help you?147 marksThe diagram shows some land in the shape of a quadrilateral, ABCD.AB = 3km, AD = 5km, CD = 12km and angle BAC = 30°. The land is sold for £10 million per square kilometre. Calculate the total cost of the land.f millionDid this page help you?15 marksThe area of triangle is m2.Calculate the value of . Give your answer correct to significant figures.Did this page help you?25 marksand are triangles.The area of triangle is 56 m2Work out the length of Give your answer correct to 1 decimal place.Did this page help you?35 marksis a parallelogram. = 9 cm = 11 cm Angle = 100°Calculate the area of the parallelogram. Give your answer correct to 3 significant figures.Did this page help you?46 marksis an acute-angled triangle.= 7cm = 8cmThe area of triangle is 18 cm2.Work out the size of angle .Give your answer correct to 3 significant figures.You must show all your working.Did this page help you?55 marksThe diagram shows a hexagon. and are congruent parallelograms where is the point on and is the point on such that Given that angle prove that Did this page help you?66 marksis an acute angled triangle.The area of triangle is 19 cm2.Work out the size of angle . Give your answer correct to 3 significant figures.Did this page help you?75 marksis a triangle. is a point on .Work out the area of triangle . Give your answer correct to 3 significant figures.Did this page help you?85 marksIn this question, all lengths are in centimetres. is a point on a circle, centre , is a point on a different circle, centre . The equation of the larger circle is radius of smaller circle = 4.5Work out the size of angle degreesDid this page help you?85 marksThe area of this triangle is Work out the value of . Give your answer in the form where and are integers greater than 1.Did this page help you?105 marksThe diagram shows a logo, and are congruent triangles. is a sector of a circle, centre . Show that the area of the logo is 510 cm2 to 2 significant figures.Did this page help you?116 marksThe diagram shows triangleGiven that angle is obtuse, work out the area of triangle . Give your answer correct to 3 significant figures.Did this page help you?124 marksThe diagram shows triangle correct to one decimal place correct to the nearest whole number correct to the nearest whole numberCalculate the upper bound for the value of Show your working clearly. Give your answer correct to 3 significant figures.Did this page help you?136 marks is a quadrilateral where and are points on a circle.Angle Angle Work out the perimeter of quadrilateral . Give your answer correct to one decimal place..... cmDid this page help you?145 marksHere is a triangle. The perimeter of the triangle is . Given that find the value of . Show your working clearly. Did this page help you?156 marksThe diagram shows a regular octagon Each side of the octagon has length Find the area of the shaded region Give your answer correct to the nearest Did this page help you?Page 4Simplifying Surds, Rationalising DenominatorsUsing a CalculatorAlgebraic Roots & IndicesAlgebraic Roots & IndicesCompleting the SquareAlgebraic ProofSolving Linear EquationsIterationEquation of a Circle, Equation of a TangentDirect & Inverse ProportionDirect Proportion, Inverse ProportionExchange Rates & Best BuysArea & Circumference of CirclesArea & Volume of Similar ShapesSimilar Areas & Volumes3D Pythagoras & Trigonometry3D Pythagoras & TrigonometryPage 5Exam code: 8300Tools designed specifically for the AQA GCSE Maths: Higher syllabus, to help you ace your exams, including: past papers, revision notes, and exam-style questions, created by our expert team of teachers and examiners[Exam specification aligned][Personalised feedback on exam answers][Written by teachers and examiners][Examiner tips and tricks][Exam practice with solutions][PDF downloads][Step-by-step mark schemes We've done the hard work for you, and put together the best revision videos on the sine, cosine and triangle area rules (the area of a non-right-angled triangle). These videos show you how to use the sine and cosine rules to find missing angles and sides of non-right-angled triangles. Also covered, is how to use the formula for finding the area of a non-right-angled triangles, A = ½absin C Sine Rule This video shows how to find missing angles and sides using the sine rule. The Sine Rule (Maths Genie) The first of these two revision videos explains how to find the missing sides in any triangle using the cosine rule. The second video shows you how to use the same rule to find the angles when they are missing. The latter requires a good understanding of rearranging formulae. Cosine rule - Finding missing sides (Corbett Maths) Cosine rule - Finding missing angles (Corbett Maths) This shows you how to use the formula A = ½absin C Although this topic is generally thought of as being for higher ability students, it's actually very easy to use this formula. Everyone taking higher tier GCSE should have looked at this video so you can access marks if a question on this comes up in the exam. Area of any triangle using A = ½absin C (Corbett Maths) Share — copy and redistribute the material in any medium or format for any purpose, even commercially. Adapt — remix, transform, and build upon the material for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the license terms. Attribution — You must give appropriate credit , provide a link to the license, and indicate if changes were made . You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. ShareAlike — If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. No additional restrictions — You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits. You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation . No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material. Area equals half the product of two sides and the sine of the included angle. You are studying the Gulf of Mexico in your Geography class. Your Instructor brings up the idea of the Bermuda Triangle. This is a place where, according to some, many planes get lost. Here is an illustration of it: Figure \(\PageIndex{1}\) The first thing this makes you think of is your math class, since that class is your favorite. You would like to know just how big the Bermuda Triangle is. Unfortunately, the Bermuda Triangle isn't a right triangle. However, you do know that the lengths of one of the sides is 950 miles, the other side is 975 miles, and the angle between them is 60° . Is there any way to use this information to help you find out just how big the Bermuda Triangle is? In Geometry, you learned that the area of a triangle is $A=\frac{1}{2}bh$, where b is the base and h is the height, or altitude. Now that you know the trig ratios, this formula can be changed around, using sine. Figure \(\PageIndex{2}\) Looking at the triangle above, you can use sine to determine h . $\sin C=\frac{h}{a}$. So, solving this equation for h , we have $h=a\sin C$. Substituting this for h , we now have a new formula for area. $A=\frac{1}{2}ab\sin C$ What this means is you do not need the height to find the area anymore. All you now need is two sides and the angle between the two sides, called the included angle. 1. Figure \(\PageIndex{3}\) Using the formula, $A=\frac{1}{2}ab\sin C$, we have $A=\frac{1}{2}(2)(4)\sin 82^\circ\approx 4(0.990\ldots)\approx 3.96$. 2. Figure \(\PageIndex{4}\) Recall that a parallelogram can be split into two triangles. So the formula for a parallelogram, using the new formula, would be: $A=2(\frac{1}{2}ab\sin C)$ or $A=ab\sin C$. Earlier, you were asked how big the Bermuda Triangle is. Solution Now that you know the equation for the area of a triangle in terms of two of the sides and the included angle, we can use that to solve for the area of the Bermuda Triangle. $A=\frac{1}{2}(16.45)(19)\sin 30^\circ\approx 8.225$. Earlier, you were asked how big the Bermuda Triangle is. Solution Now that you know the equation for the area of a triangle in terms of two of the sides and the included angle, we can use that to solve for the area of the Bermuda Triangle. $A=\frac{1}{2}(950)(975)\sin 60^\circ\approx 401066.25$. The area of the triangle is approximately 401,066 square miles. Find the area of the triangle. Figure \(\PageIndex{6}\) Solution Using the formula, $A=\frac{1}{2}ab\sin C$, we have $A=\frac{1}{2}(4)(15)\sin 25^\circ\approx 4(0.4226\ldots)\approx 1.69$. Find the area of the triangle. Figure \(\PageIndex{8}\) Solution Using the formula, $A=\frac{1}{2}ab\sin C$, we have $A=\frac{1}{2}(10)(11)\sin 32^\circ\approx 5(0.53\ldots)\approx 2.65$. Use the following picture for questions 3 and 4. Figure \(\PageIndex{10}\) Find the values of a , b , and C needed for the formula to find the area of the triangle. Now find the area of the triangle. Find the area of each triangle below. Figure \(\PageIndex{11}\) Figure \(\PageIndex{12}\) Figure \(\PageIndex{13}\) Figure \(\PageIndex{14}\) Figure \(\PageIndex{15}\) Figure \(\PageIndex{16}\) Figure \(\PageIndex{17}\) Find the area of each parallelogram. Figure \(\PageIndex{18}\) Figure \(\PageIndex{19}\) Describe another way you could have found the area of the parallelogram in the previous problem. When you first learned about sine, you learned how it worked for right triangles. Explain why this method for calculating area uses sine, but works for non-right triangles. To see the Review answers, open this PDF file and look for section 1.12. Vocabulary Term Definition Included Angle The included angle in a triangle is the angle between two known sides. sine The sine of an angle in a right triangle is a value found by dividing the length of the side opposite the given angle by the length of the hypotenuse. LICENSED UNDER . . . triangles How can financial brands set themselves apart through visual storytelling? Our experts explain how.Learn MoreThe Motorsport Images Collections captures events from 1895 to today's most recent coverage.Discover The CollectionCurated, compelling, and worth your time. Explore our latest gallery of Editors' Picks.Browse Editors' FavoritesHow can financial brands set themselves apart through visual storytelling? Our experts explain how.Learn MoreThe Motorsport Images Collections captures events from 1895 to today's most recent coverage.Discover The CollectionCurated, compelling, and worth your time. Explore our latest gallery of Editors' Picks.Browse Editors' FavoritesThe area of a right triangle can be found using the formula $A = \frac{1}{2}bh$. The area of any other triangle can be found with the formula below. This formula works for a right triangle as well, since the sine of 90 is one. They're really not significantly different, though the derivation of the formula for a non-right triangle is a little different. As is the case with the sine rule and the cosine rule, the sides and angles are not fixed. The relationship between sides and angles is noted by the use of the same letter, in different cases. (A and a are opposite). So, to use the formula for area of a triangle you need two sides and the included angle. In other words, the two sides you need are the sides of the angle. Example 1. Find the area of the triangle below. Make sure your angle is included (adjacent) to the two sides, then plug in the information. If you need to do some work to find the included angle first, then use either sine rule or the cosine rule, or if you know the other two angles, the fact that the sum of the angles of a triangle is 180° to find the missing angle. Copyright © Maths Genie. Maths Genie Limited is a company registered in England and Wales with company number 14341280. Registered Office: 86-90 Paul Street, London, England, EC2A 4NE. There are several ways to find the area of a triangle: $q8zqH3VR6KY$ When we know the base and height it is easy. It is simply half of b times h $A = \frac{1}{2}bh$ The most important thing is that the base and height are at right angles. The Triangles page explains more. Have a play here: $../geometry/images/triangle.js?mode=area$ (Note: 12 is the height, not the length of the left-hand side) Base: $b = 20$ Height: $h = 12$ $A = \frac{1}{2}bh = \frac{1}{2} \times 20 \times 12 = 120$ 627,723, 3132, 3133 There's also a formula to find the area of any triangle when we know the lengths of all three of its sides. This can be found on the Heron's Formula page. When we know two sides and the included angle (SAS), there is another formula (in fact three equivalent formulas) we can use. Depending on which sides and angles we know, the formula can be written in three ways: $A = 12ab \sin C$ $A = 12bc \sin A$ $A = 12ca \sin B$ They are really the same formula, just with the sides and angle changed. First of all we must decide what we know. We know angle $C = 25^\circ$, and sides $a = 7$ and $b = 10$. So let's get going: $A = \frac{1}{2}ab \sin C$ Put in the values we know: $\frac{1}{2} \times 7 \times 10 \times \sin(25^\circ)$ Do some calculator work: $35 \times 0.4226\ldots$ $A = 14.8$ to one decimal place How to Remember Just think "abc": $A = \frac{1}{2}a \sin C$ It is also good to remember that the angle is always between the two known sides, called the "included angle". How Does it Work? We start with this formula: $A = \frac{1}{2} \times \text{base} \times \text{height}$ We know the base is c , and can work out the height: the height is $b \times \sin A$ So we get: $A = \frac{1}{2} \times (c) \times (b \times \sin A)$ Which can be simplified to: $A = 12bc \sin A$ By changing the labels on the triangle we can also get: $A = \frac{1}{2} ab \sin C$ $A = \frac{1}{2} ca \sin B$ One more example: Farmer Rigby owns a triangular piece of land. The length of the fence AB is 150 m. The angle between fence AB and fence BC is 123° . How much land does Farmer Rigby own? First of all we must decide which lengths and angles we know: $AB = c = 150$ m, $BC = a = 231$ m, and angle $B = 123^\circ$ So we use: $A = 12ca \sin B$ Put in the values we know: $\frac{1}{2} \times 150 \times 231 \times \sin(123^\circ)$ m² Do some calculator work: $17,325 \times 0.838\ldots$ m² $A = 14,530$ m² Farmer Rigby has 14,530 m² of land 259, 1520, 1521, 1522,260, 1523, 2344, 2345, 3940, 3941 Copyright © 2024 Rod Pierce