HIGHER

3.2 The Sine Rule, Cosine Rule and Area of a Triangle: 1-hour Pack

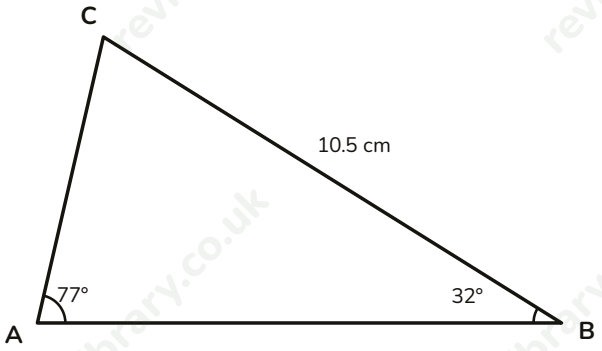
Total Marks

EDEXCEL 4MA1 · Calculator allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

Show full working for multi-step questions. Write answers in clear sentences for questions where a reason is asked. Suggested time 60 minutes.

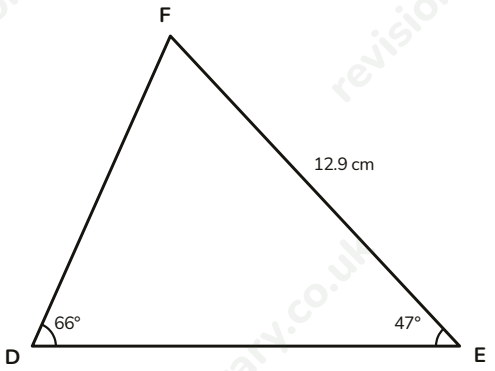
1 In triangle ABC, angle A = 77 degrees, angle B = 32 degrees and BC = 10.5 cm. Calculate the length of AC. Give your answer to 1 decimal place.



(Total for Question 1 is 3 marks)

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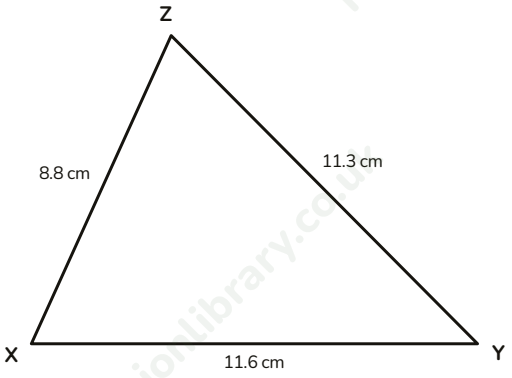
2 In triangle DEF, angle D = 66 degrees, angle E = 47 degrees and EF = 12.9 cm.
Calculate the area of the triangle. Give your answer to 1 decimal place.



(Total for Question 2 is 5 marks)

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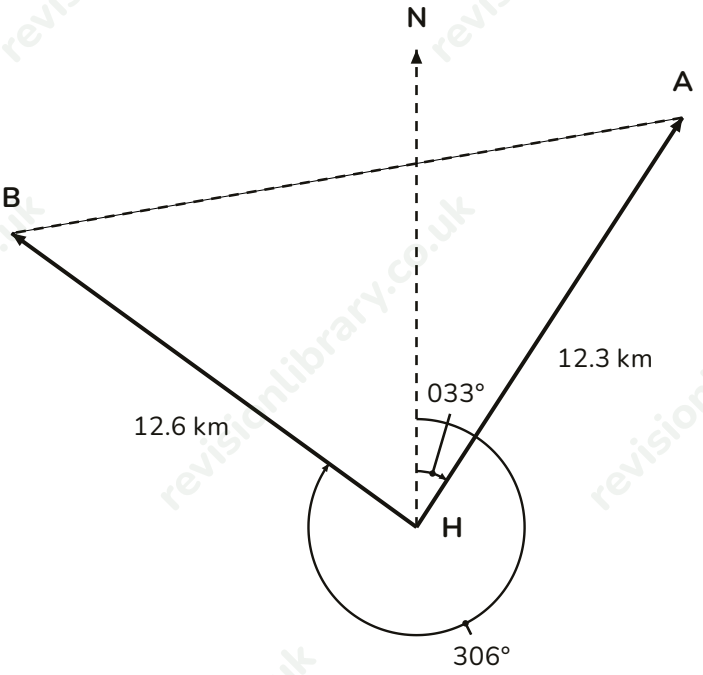
3 Triangle XYZ has YZ = 11.3 cm, XZ = 8.8 cm and XY = 11.6 cm.
Work out the area of the triangle. Give your answer to 1 decimal place.



(Total for Question 3 is 4 marks)

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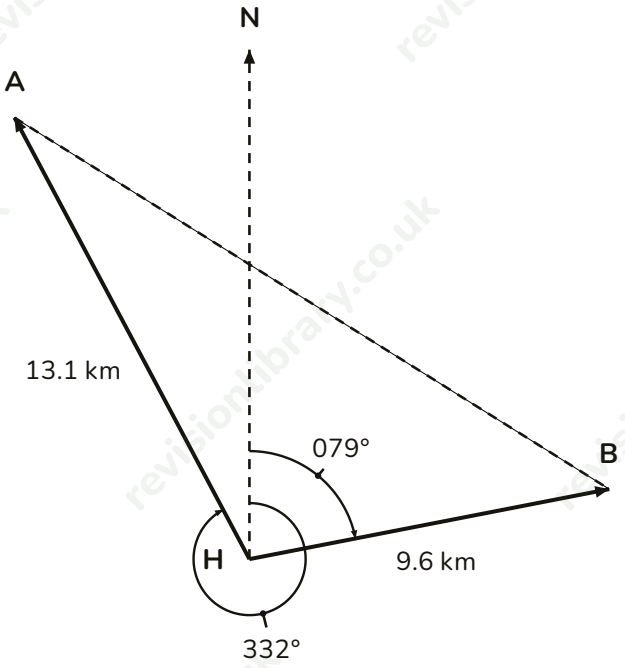
4 Two boats leave a harbour H at the same time. Boat A sails 12.3 km on a bearing of 033 degrees. Boat B sails 12.6 km on a bearing of 306 degrees.
Calculate the bearing of B from A. Give your answer to the nearest degree.



(Total for Question 4 is 5 marks)

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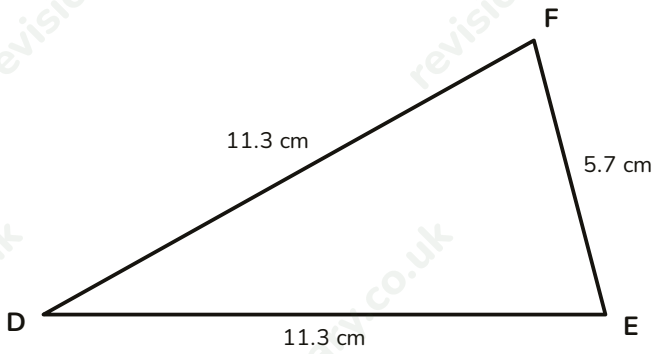
5 Two boats leave a harbour H at the same time. Boat A sails 13.1 km on a bearing of 332 degrees. Boat B sails 9.6 km on a bearing of 079 degrees.
Calculate the distance between the boats. Give your answer to 1 decimal place.



(Total for Question 5 is 4 marks)

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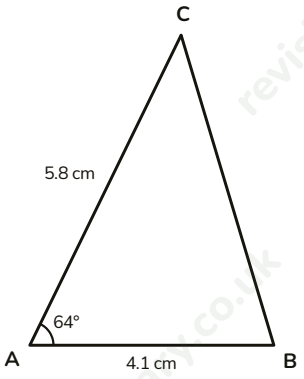
6 In triangle DEF, EF = 5.7 cm, DF = 11.3 cm and DE = 11.3 cm.
Calculate the size of angle F. Give your answer to 1 decimal place.



(Total for Question 6 is 3 marks)

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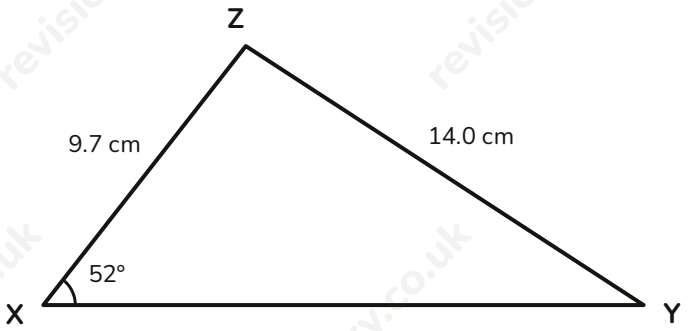
7 In triangle ABC, AB = 4.1 cm, AC = 5.8 cm and angle A = 64 degrees.
Calculate the length of BC. Give your answer to 1 decimal place.



(Total for Question 7 is 3 marks)

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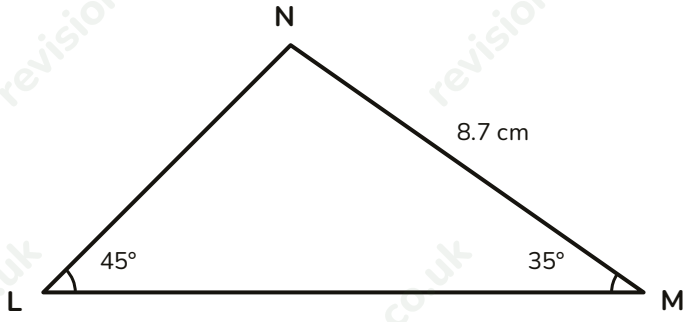
8 In triangle XYZ, angle X = 52 degrees, YZ = 14.0 cm and XZ = 9.7 cm.
Calculate the size of angle Y, given that it is acute. Give your answer to 1 decimal place.



(Total for Question 8 is 3 marks)

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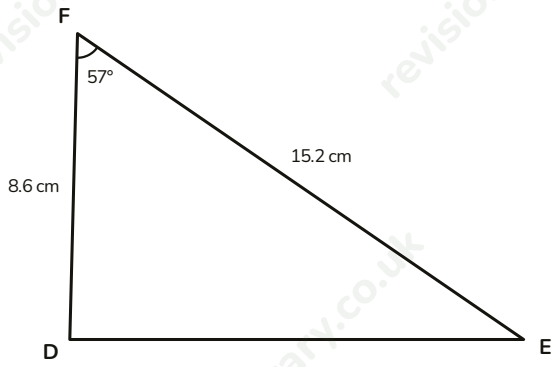
9 In triangle LMN, angle L = 45 degrees, angle M = 35 degrees and MN = 8.7 cm.
Calculate the length of LN. Give your answer to 1 decimal place.



(Total for Question 9 is 3 marks)

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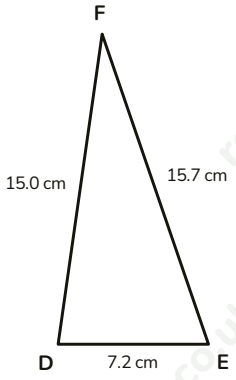
10 In triangle DEF, DF = 8.6 cm, EF = 15.2 cm and angle F = 57 degrees.
Calculate the area of the triangle. Give your answer to 1 decimal place.



(Total for Question 10 is 2 marks)

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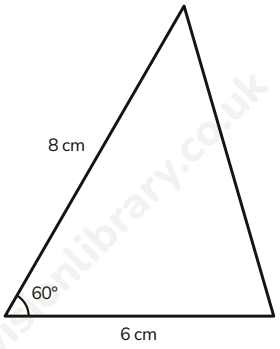
11 Triangle DEF has EF = 15.7 cm, DF = 15.0 cm and DE = 7.2 cm.
Work out the area of the triangle. Give your answer to 1 decimal place.



(Total for Question 11 is 4 marks)

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12 A triangular prism has an equilateral triangular cross-section with side 6 cm. A triangle is formed by one edge of length 6 cm on a triangular face and a line of length 8 cm from one end of that edge to a point elsewhere on the prism, with an angle of 60 degrees between the 6 cm edge and the 8 cm line. Work out the area of that triangle using 1/2 ab sin C and give your answer correct to 1 decimal place.



(Total for Question 12 is 3 marks)

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Mark scheme · 3.2 The Sine Rule, Cosine Rule and Area of a Triangle: 1-hour Pack

Question 1

sine rule: AC/sin 32 = 10.5/sin 77	**M1**
rearranges: AC = 10.5 x sin 32 / sin 77	**M1**
AC = 5.7 cm	**A1**

Answer: AC = 5.7 cm

Question 2

angle F = 180 - 66 - 47 = 67 degrees	**M1**
sine rule: DF = 12.9 x sin 47 / sin 66	**M1**
DF = 10.327 cm (retained)	**A1**
area = (1/2) x 12.9 x 10.327 x sin 67	**M1**
area = 61.3 cm²	**A1**

Answer: 61.3 cm^2

Question 3

cosine rule: cos Z = $(11.3^2 + 8.8^2 - 11.6^2) / (2 \times 11.3 \times 8.8)$	**M1**
angle Z = 69.22 degrees (more decimal places retained)	**A1**
area = (1/2) x 11.3 x 8.8 x sin Z	**M1**
area = 46.5 cm²	**A1**

Answer: 46.5 cm^2

Question 4

angle AHB = 87 degrees	**M1**
cosine rule to find AB = 17.14 km	**M1**
sine rule to find angle HAB = 47.2 degrees (acute or obtuse chosen from the diagram)	**M1**
uses the north line at A: bearing of H from A is the reverse of the bearing of A from H, then adds or subtracts the angle HAB	**M1**
bearing = 260 degrees	**A1**

Answer: 260 degrees

Question 5

angle AHB = 107 degrees (difference of the bearings)	**M1**
cosine rule: $AB^2 = 13.1^2 + 9.6^2 - 2 \times 13.1 \times 9.6 \times \cos 107$	**M1**
$AB^2 = 337.31$	**A1**
AB = 18.4 km	**A1**

Answer: 18.4 km

Question 6

cosine rule: cos F = $(5.7^2 + 11.3^2 - 11.3^2) / (2 \times 5.7 \times 11.3)$	**M1**
cos F = 0.2522	**M1**
angle F = 75.4 degrees	**A1**

Answer: Angle F = 75.4 degrees

Question 7

cosine rule: $BC^2 = 5.8^2 + 4.1^2 - 2 \times 5.8 \times 4.1 \times \cos 64$	**M1**
$BC^2 = 29.60$	**M1**
BC = 5.4 cm	**A1**

Answer: BC = 5.4 cm

Question 8

sine rule: sin Y / 9.7 = sin 52 / 14.0	**M1**
sin Y = 9.7 x sin 52 / 14.0 = 0.5460	**M1**
angle Y = 33.1 degrees	**A1**

Answer: Angle Y = 33.1 degrees

Question 9

sine rule: LN/sin 35 = 8.7/sin 45	**M1**
rearranges: LN = 8.7 x sin 35 / sin 45	**M1**
LN = 7.1 cm	**A1**

Answer: LN = 7.1 cm

Question 10

area = (1/2) x 8.6 x 15.2 x sin 57	**M1**
area = 54.8 cm²	**A1**

Answer: 54.8 cm^2

Question 11

cosine rule: cos F = $(15.7^2 + 15.0^2 - 7.2^2) / (2 \times 15.7 \times 15.0)$	**M1**
angle F = 27.00 degrees (more decimal places retained)	**A1**
area = (1/2) x 15.7 x 15.0 x sin F	**M1**
area = 53.5 cm²	**A1**

Answer: 53.5 cm^2

Question 12

identifies the triangle sides to use: face edge = 6 cm, line to the third point = 8 cm, and the given angle of 60 degrees between them	**M1**
substitutes into area formula Area = 1/2 * 6 * 8 * sin60 and evaluates correctly	**M1**
gives area = 20.8 cm² correct to 1 decimal place, cao	**A1**

Answer: 20.8 cm^2

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