5.19 SOHCAHTOA (Trigonometry): 1-hour Pack

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

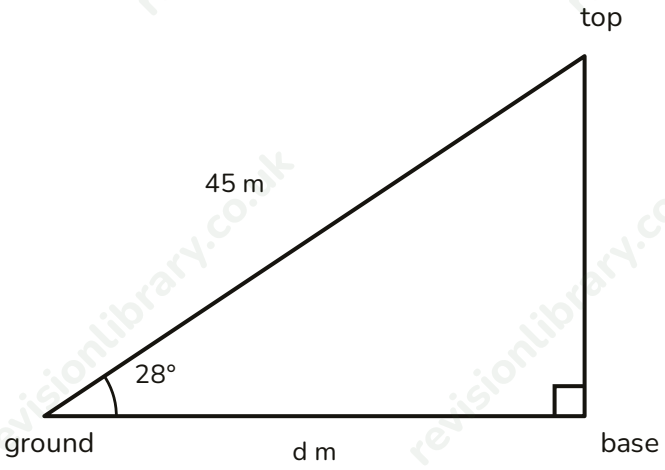
Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A zip-wire is fixed at the top of a tower and runs down to a point on the ground. The zip-wire is 45 m long and makes an angle of 28 degrees with the horizontal ground. Calculate the horizontal distance, d, from the base of the tower to the point where the zip-wire meets the ground. Give your answer correct to 3 significant figures.

Diagram NOT accurately drawn

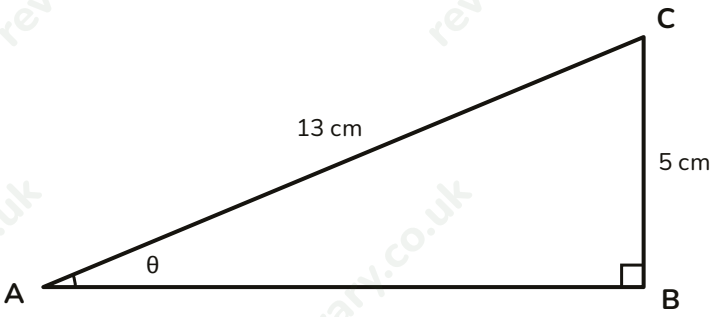


(Total for Question 1 is 2 marks)

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2 A right-angled triangle has hypotenuse 13 cm and one shorter side 5 cm. The side of length 5 cm is opposite angle θ. Work out the angle θ. Give your answer to the nearest degree.

Diagram NOT accurately drawn

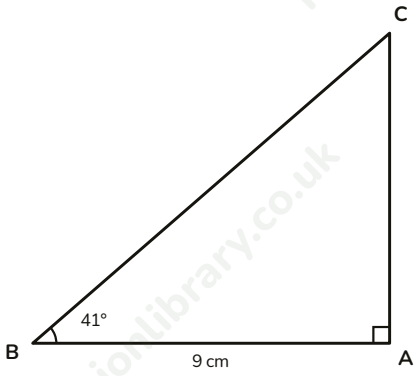


(Total for Question 2 is 4 marks)

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3 In triangle ABC, angle A is 90 degrees. Side AB = 9 cm and angle B = 41 degrees. Work out the length of side AC to the nearest millimetre.

Diagram NOT accurately drawn



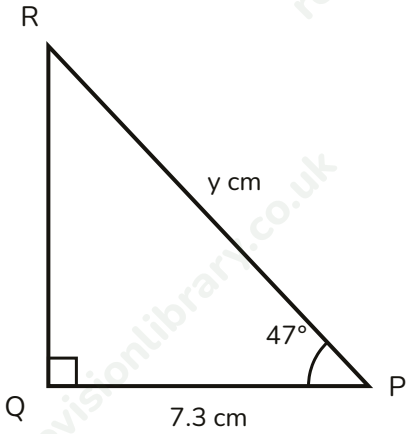
(Total for Question 3 is 4 marks)

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4 In triangle PQR, angle Q = 90 degrees, angle P = 47 degrees and side PQ (adjacent to angle P) = 7.3 cm.

Calculate the length of the hypotenuse, PR. Give your answer correct to 3 significant figures.

Diagram NOT accurately drawn



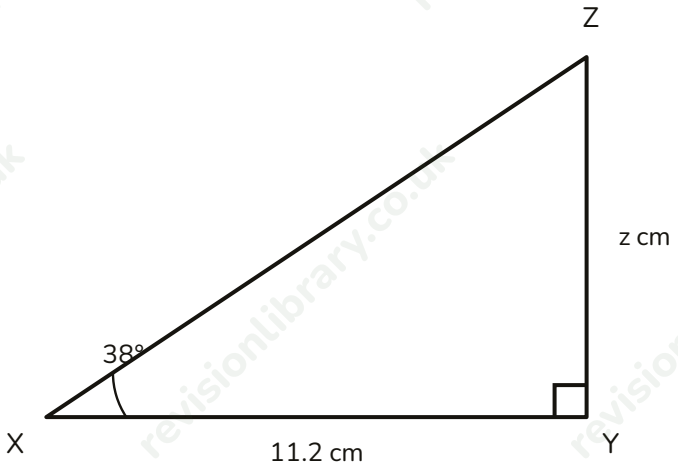
(Total for Question 4 is 3 marks)

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5 In triangle XYZ, angle Y = 90 degrees, angle X = 38 degrees and side XY (adjacent to angle X) = 11.2 cm.

Calculate the length of YZ, marked z. Give your answer correct to 3 significant figures.

Diagram NOT accurately drawn

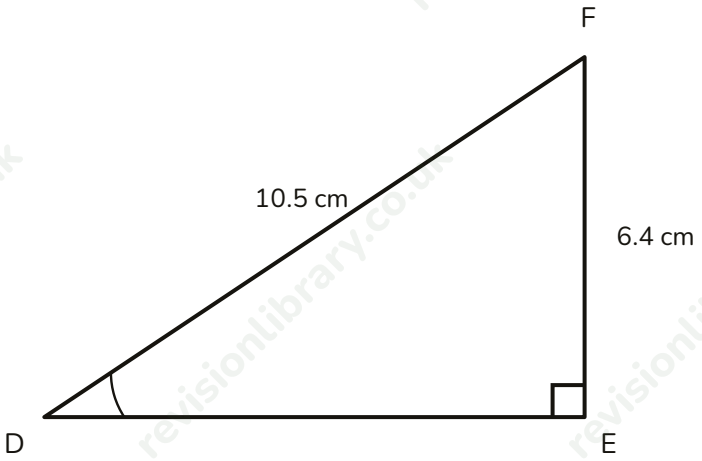


(Total for Question 5 is 3 marks)

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6 In triangle DEF, angle E = 90 degrees, the side opposite angle D (EF) = 6.4 cm and the hypotenuse DF = 10.5 cm.
Calculate the size of angle D. Give your answer correct to 1 decimal place.

Diagram NOT accurately drawn

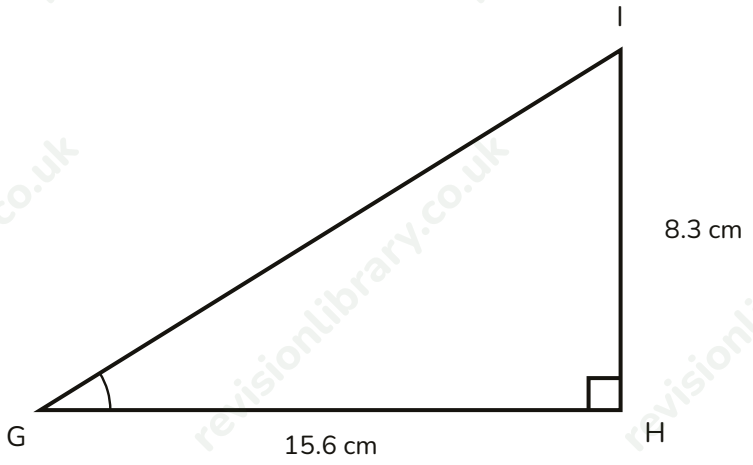


(Total for Question 6 is 3 marks)

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7 In triangle GHI, angle H = 90 degrees, side GH (adjacent to angle G) = 15.6 cm and side HI (opposite angle G) = 8.3 cm.
Calculate the size of angle G. Give your answer correct to 1 decimal place.

Diagram NOT accurately drawn

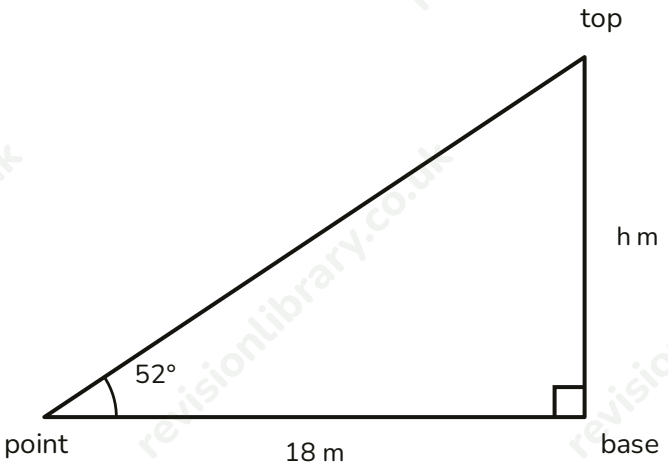


(Total for Question 7 is 3 marks)

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8 From a point on level ground 18 m from the base of a lighthouse, the angle of elevation to the top of the lighthouse is 52 degrees. Calculate the height of the lighthouse. Give your answer correct to 3 significant figures.

Diagram NOT accurately drawn

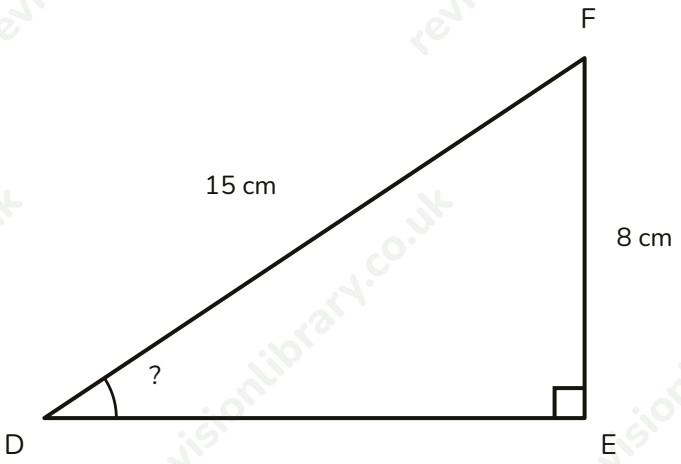


(Total for Question 8 is 2 marks)

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9 In right-angled triangle DEF, the right angle is at E. EF = 8 cm and the hypotenuse DF = 15 cm. Calculate the size of angle D. Give your answer correct to 1 decimal place.

Diagram NOT accurately drawn

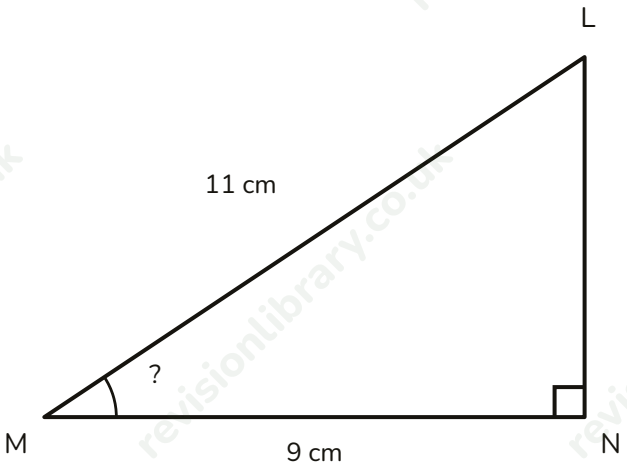


(Total for Question 9 is 2 marks)

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10 In right-angled triangle LMN, the right angle is at N. MN = 9 cm is adjacent to angle M, and the hypotenuse ML = 11 cm. Calculate the size of angle M. Give your answer correct to 1 decimal place.

Diagram NOT accurately drawn

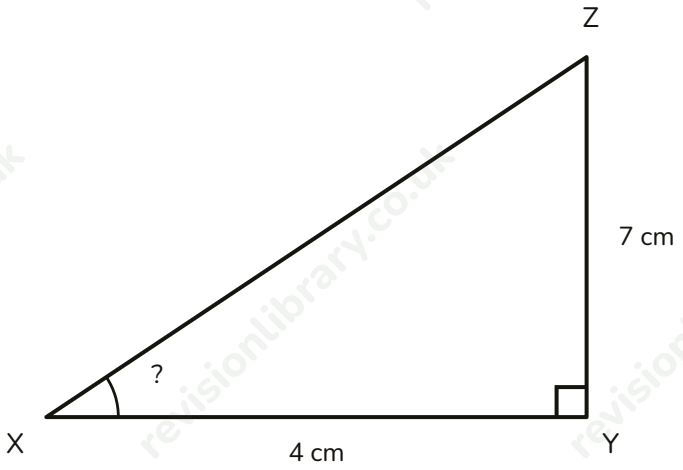


(Total for Question 10 is 2 marks)

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11 In right-angled triangle XYZ, the right angle is at Y. The side opposite angle X is 7 cm and the side adjacent to angle X is 4 cm. Calculate the size of angle X. Give your answer correct to 1 decimal place.

Diagram NOT accurately drawn

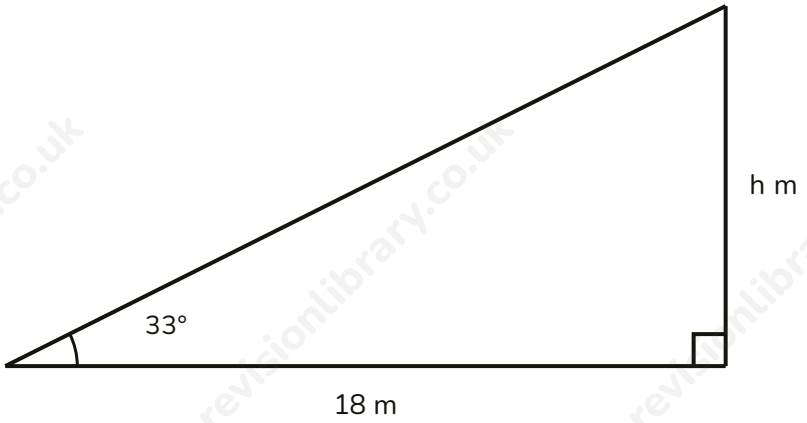


(Total for Question 11 is 2 marks)

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12 A triangular plot of land has a horizontal base of 18 m. At one end of the base, the angle between the base and the sloping boundary is 33 degrees.

Diagram NOT accurately drawn



(a) Calculate the height, h, of the triangular plot. Give your answer correct to 3 significant figures. **(3)**

.....

(b) Hence calculate the area of the triangular plot. Give your answer correct to 3 significant figures. **(2)**

.....

(Total for Question 12 is 5 marks)

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13 Without using a calculator, write down the exact value of each of the following trigonometric ratios.

(a) sin(30 degrees) **(1)**

.....

(b) cos(60 degrees) **(1)**

.....

(c) tan(45 degrees) **(1)**

.....

(d) sin(45 degrees), giving your answer as an exact surd. **(1)**

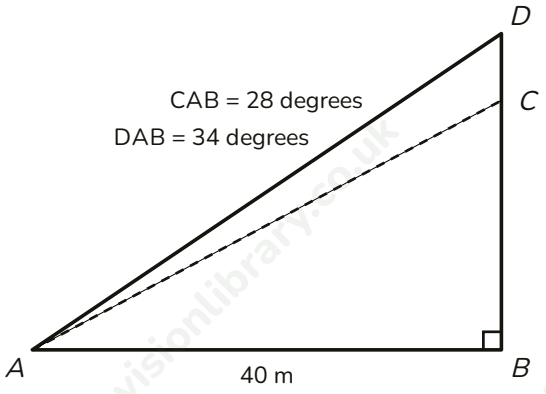
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(Total for Question 13 is 4 marks)

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14 A tall building BC stands on horizontal ground, and a vertical flagpole CD stands on top of the building at C. From a point A on the ground, 40 m from the base B of the building, the angle of elevation to the top of the building, C, is 28 degrees, and the angle of elevation to the top of the flagpole, D, is 34 degrees.

Diagram NOT accurately drawn



(a) Calculate the height BC of the building. Give your answer correct to 3 significant figures. **(2)**

.....

(b) Calculate the height CD of the flagpole. Give your answer correct to 3 significant figures. **(3)**

.....

(c) Calculate the distance AD, from A to the top of the flagpole. Give your answer correct to 3 significant figures. **(2)**

.....

(Total for Question 14 is 7 marks)

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Mark scheme · 5.19 SOHCAHTOA (Trigonometry): 1-hour Pack

Question 1

d = 45 cos(28) oe	**M1**
awrt 39.7 (m)	**A1**

Answer: d = 39.7 m (3 s.f.)

Question 2

identify sine relation: sin(θ) = opposite/hypotenuse	**M1**
substitute: sin(θ) = 5/13	**M1**
use inverse sine: $\theta = \sin^{-1}(5/13)$ oe	**M1**
θ = 23 degrees to nearest degree cao	**A1**

Answer: 23 degrees

Question 3

identify relation: AC is opposite angle B and AB is adjacent so tan41 = AC/AB	**M1**
rearrange: AC = AB * tan41	**M1**
AC = 9 * tan41 = 9 * 0.869287... = 7.82358... cm	**A1**
7.82 cm => 78.2 mm => 78 mm cao	**A1**

Answer: 78 mm

Question 4

cos(47) = 7.3 / y oe	**M1**
y = 7.3 / cos(47)	**M1**
awrt 10.7 cm	**A1**

Answer: 10.7 cm (3 s.f.)

Question 5

tan(38) = z / 11.2 oe	**M1**
z = 11.2 x tan(38)	**M1**
awrt 8.75 cm	**A1**

Answer: 8.75 cm (3 s.f.)

Question 6

sin(D) = 6.4 / 10.5 oe	**M1**
$D = \sin^{-1}(6.4 / 10.5)$	**M1**
awrt 37.6 degrees	**A1**

Answer: 37.6 degrees (1 d.p.)

Question 7

tan(G) = 8.3 / 15.6 oe	**M1**
$G = \tan^{-1}(8.3 / 15.6)$	**M1**
awrt 28.0 degrees	**A1**

Answer: 28.0 degrees (1 d.p.)

Question 8

height = 18 tan(52) oe	**M1**
awrt 23 (m)	**A1**

Answer: height = 23 m (3 s.f.)

Question 9

sin D = 8/15 oe	**M1**
awrt 32.2 (degrees)	**A1**

Answer: angle D = 32.2 degrees (1 d.p.)

Question 10

cos M = 9/11 oe	**M1**
awrt 35.1 (degrees)	**A1**

Answer: angle M = 35.1 degrees (1 d.p.)

Question 11

tan X = 7/4 oe	**M1**
awrt 60.3 (degrees)	**A1**

Answer: angle X = 60.3 degrees (1 d.p.)

Question 12

(a) tan(33) = h / 18 oe	**M1**
(a) h = 18 x tan(33)	**M1**
(a) awrt 11.7 m	**A1**

(a) Answer: 11.7 m (3 s.f.)

(b) 0.5 x 18 x (their h) oe	**M1**
(b) awrt 105 m² ft from part a	**A1**

(b) Answer: 105 m^2 (3 s.f.)

Question 13

(a) 1/2 oe (0.5) cao	**B1**

(a) Answer: 1/2

(b) 1/2 oe (0.5) cao	**B1**

(b) Answer: 1/2

(c) 1 cao	**B1**

(c) Answer: 1

(d) $\sqrt{2}/2$ oe (e.g. $1/\sqrt{2}$) cao, exact form required	**B1**

(d) Answer: $\sqrt{2}/2$

Question 14

(a) BC = 40 tan(28) oe	**M1**
(a) awrt 21.3 (m)	**A1**

(a) Answer: BC = 21.3 m (3 s.f.)

(b) BD (total height) = 40 tan(34) oe	**M1**
(b) CD = their BD - their BC (ft)	**M1**
(b) awrt 5.71 (m)	**A1**

(b) Answer: CD = 5.71 m (3 s.f.)

(c) AD = 40 / cos(34) oe	**M1**
(c) awrt 48.2 (m)	**A1**

(c) Answer: AD = 48.2 m (3 s.f.)

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