HIGHER

5.20 Exact trig values: 30-minute Pack

EDEXCEL 1MA1 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Write down the exact value of tan 45 degrees.

(Total for Question 1 is 1 mark)

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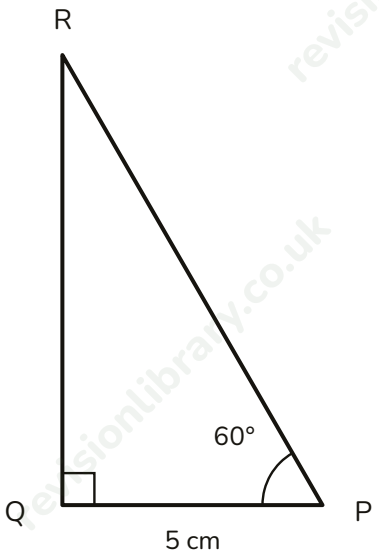
2 Work out the exact value of cos 30 degrees minus sin 60 degrees.

(Total for Question 2 is 2 marks)

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3 Triangle PQR has a right angle at Q. Angle P = 60 degrees and PQ = 5 cm. Calculate the length of QR. Give your answer as an exact value in the form k $\sqrt{3}$.

Diagram NOT accurately drawn

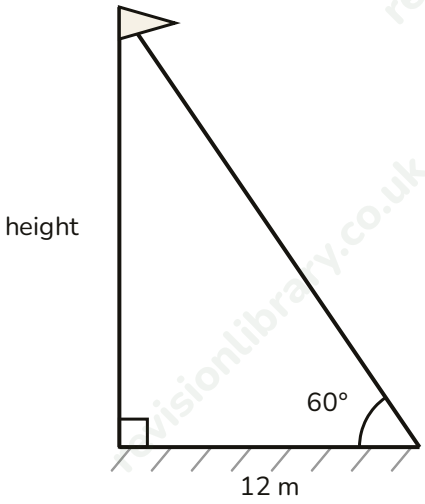


(Total for Question 3 is 3 marks)

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4 A flagpole casts a shadow 12 m long on horizontal ground. The angle of elevation of the sun is 60 degrees. Calculate the exact height of the flagpole. Give your answer in the form k $\sqrt{3}$.

Diagram NOT accurately drawn

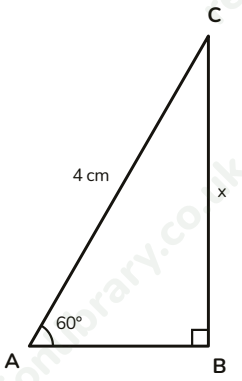


(Total for Question 4 is 3 marks)

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5 In a right-angled triangle the hypotenuse is 4 cm and one of the acute angles is 60 degrees. Work out the length of the side opposite this angle. Give your answer as an exact value, without using a calculator.

Diagram NOT accurately drawn



(Total for Question 5 is 3 marks)

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6 Given that $\cos x = \sqrt{3}/2$ and x is an acute angle, write down the value of x in degrees.

(Total for Question 6 is 1 mark)

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7 Solve, for $0 \leq x \leq 90$, $\sin x = \sqrt{3}/2$

(Total for Question 7 is 2 marks)

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8 Simplify the following expression to an exact surd form, showing working.

(1 - cos 60 degrees) / sin 30 degrees

Simplify (1 - cos 60) / sin 30 to an exact value. **(3)**

(Total for Question 8 is 3 marks)

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9 Show that 1/cos(30) can be written in the form $(2\sqrt{3})/3$

(Total for Question 9 is 3 marks)

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10 A student claims that sin 45 degrees + sin 45 degrees is equal to sin 90 degrees. By finding the exact value of each side, determine whether the student is correct. You must show your working and give a reason for your conclusion.

(Total for Question 10 is 3 marks)

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Mark scheme · 5.20 Exact trig values: 30-minute Pack

Question 1

1 cao	**B1**

Answer: 1

Question 2

substitute cos 30 = $\sqrt{3}/2$ and sin 60 = $\sqrt{3}/2$ or equivalent method	**M1**
0 cao	**A1**

Answer: 0

Question 3

tan(60) = QR/PQ or equivalent correct trig equation set up	**M1**
QR = 5 x tan(60) with tan60 = $\sqrt{3}$ substituted	**M1**
QR = 5 $\sqrt{3}$ cm cao	**A1**

Answer: QR = 5 $\sqrt{3}$ cm

Question 4

tan(60) = height/12 or equivalent correct trig equation set up	**M1**
height = 12 x tan(60) with tan60 = $\sqrt{3}$ substituted	**M1**
height = 12 $\sqrt{3}$ m cao	**A1**

Answer: 12 $\sqrt{3}$ m

Question 5

4 x sin 60 oe	**M1**
exact value of sin 60 used	**M1**
$2\sqrt{3}$ cm oe	**A1**

Answer: $2\sqrt{3}$ cm

Question 6

30 degrees	**B1**

Answer: 30 degrees

Question 7

recognise $\sqrt{3}/2$ as an exact sine value	**M1**
x = 60 cao	**A1**

Answer: x = 60

Question 8

substitute cos60 = 1/2 and sin30 = 1/2 or show equivalent method	**M1**
compute numerator 1 - 1/2 = 1/2 and divide by 1/2	**M1**
1 cao	**A1**

Answer: 1

Question 9

cos(30) = $\sqrt{3}/2$ substituted, giving 1/cos30 = $2/\sqrt{3}$	**M1**
multiplying numerator and denominator by $\sqrt{3}$ to rationalise	**M1**
$(2\sqrt{3})/3$ cso, answer given	**A1**

Answer: $(2\sqrt{3})/3$

Question 10

finds sin45 + sin45 = 2 x $\sqrt{2}/2 = \sqrt{2}$	**M1**
finds sin90 = 1	**M1**
correct conclusion with reason, e.g. 'not correct because $\sqrt{2}$ does not equal 1' (dependent on both previous marks)	**A1**

Answer: Not correct: sin45 + sin45 = $\sqrt{2}$, but sin90 = 1, and $\sqrt{2}$ does not equal 1.

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