HIGHER

5.20 Exact trig values: 1-hour Pack

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Write down the exact value of sin 45 degrees.

(Total for Question 1 is 1 mark)

2 Write down the exact value of cos 45 degrees.

(Total for Question 2 is 1 mark)

3 Write down the exact value of each of the following.

(a) sin 0 **(1)**

(b) cos 0 **(1)**

(c) sin 90 **(1)**

(d) cos 90 **(1)**

(Total for Question 3 is 4 marks)

© Revision Library | revisionlibrary.co.uk

4 Write down the exact value of sin 0 degrees.

(Total for Question 4 is 1 mark)

---

5 Write down the exact value of cos 60 degrees.

(Total for Question 5 is 1 mark)

---

6 Write down the exact value of sin 60 degrees, giving your answer as a surd in its simplest form.

(Total for Question 6 is 1 mark)

---

7 Write down the exact value of cos 30 degrees, giving your answer as a surd in its simplest form.

(Total for Question 7 is 1 mark)

---

8 Write down the exact value of tan 60 degrees, giving your answer as a surd in its simplest form.

(Total for Question 8 is 1 mark)

---

9 Write down the exact value of tan 30 degrees, giving your answer in the form $\sqrt{a}/b$, where a and b are positive integers.

(Total for Question 9 is 1 mark)

---

10 Write down the exact value of cos 0 degrees.

(Total for Question 10 is 1 mark)

© Revision Library | revisionlibrary.co.uk

11 Write down the exact value of tan 0 degrees.

(Total for Question 11 is 1 mark)

---

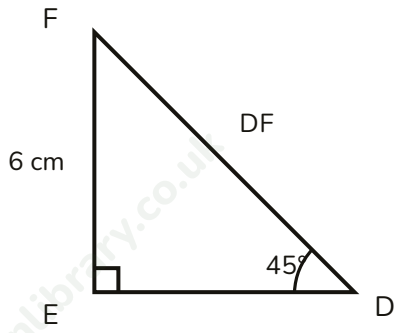
12 Write down the exact value of sin 90 degrees.

(Total for Question 12 is 1 mark)

---

13 Triangle DEF has a right angle at E. Angle D = 45 degrees and EF = 6 cm. Calculate the length of the hypotenuse DF. Give your answer as an exact value in the form k $\sqrt{2}$.

Diagram NOT accurately drawn



(Total for Question 13 is 3 marks)

---

14 Work out the exact value of cos 30 x tan 0, where the angles are in degrees. Give your answer in its simplest form without using a calculator.

(Total for Question 14 is 4 marks)

© Revision Library | revisionlibrary.co.uk

15 Given that tan x = 1 and x is an acute angle, write down the value of x in degrees.

(Total for Question 15 is 1 mark)

---

16 Work out the exact value of sin 60 + cos 60. Give your answer as a single fraction in its simplest form.

(Total for Question 16 is 2 marks)

---

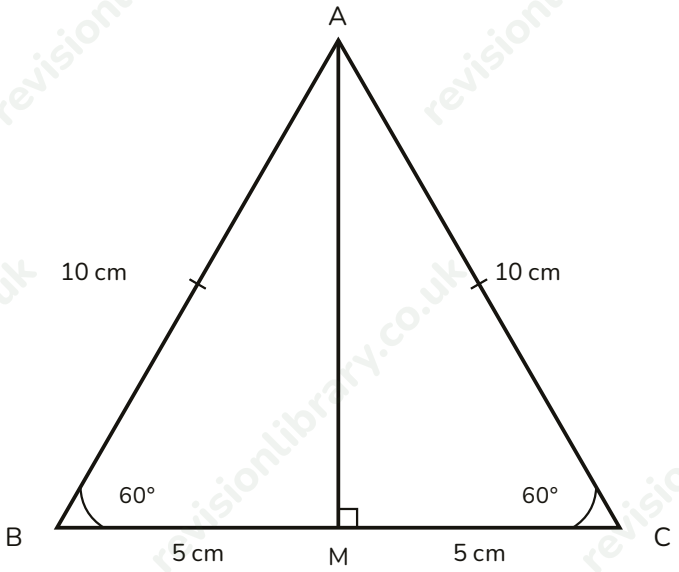
17 Solve, for $0 \leq x \leq 90$, $\tan x = \sqrt{3}/3$. Give a reason for your answer.

(Total for Question 17 is 2 marks)

© Revision Library | revisionlibrary.co.uk

18 Triangle ABC is equilateral with each side of length 10 cm. M is the midpoint of BC.

Diagram NOT accurately drawn



(a) Calculate the exact length of AM, the height of the triangle. Give your answer in the form k $\sqrt{3}$. **(3)**

.....

(b) Hence calculate the exact area of triangle ABC. Give your answer in the form k $\sqrt{3}$. **(2)**

.....

(Total for Question 18 is 5 marks)

---

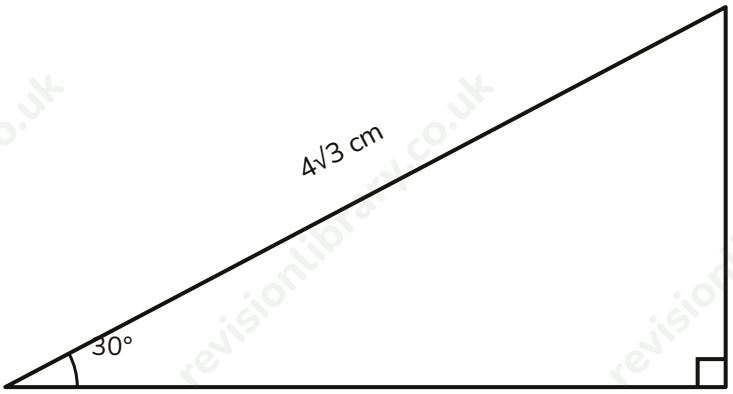
19 Show that $(\sin 45 + \cos 45)^2 = 2$

(Total for Question 19 is 3 marks)

© Revision Library | revisionlibrary.co.uk

20 A right-angled triangle has a hypotenuse of length $4\sqrt{3}$ cm and one other angle of 30 degrees. Work out the exact perimeter of the triangle. Give your answer in the form $a + b\sqrt{3}$, where a and b are integers.

Diagram NOT accurately drawn



(Total for Question 20 is 5 marks)

---

21 Show that 1/(tan 30 degrees) can be written as $\sqrt{3}$. Hence work out the exact value of $(1/(\tan 30 \text{ degrees}))^2 + (\tan 60 \text{ degrees})^2$, giving your answer as an integer.

(Total for Question 21 is 5 marks)

© Revision Library | revisionlibrary.co.uk

Mark scheme · 5.20 Exact trig values: 1-hour Pack

Question 1

$\sqrt{2}/2$ cao **B1**

Answer: $\sqrt{2}/2$

Question 2

$\sqrt{2}/2$ cao **B1**

Answer: $\sqrt{2}/2$

Question 3

(a) 0 cao **B1**

(a) Answer: 0

(b) 1 cao **B1**

(b) Answer: 1

(c) 1 cao **B1**

(c) Answer: 1

(d) 0 cao **B1**

(d) Answer: 0

Question 4

0 cao **B1**

Answer: 0

Question 5

1/2 oe cao **B1**

Answer: 1/2

Question 6

$\sqrt{3}/2$ oe **B1**

Answer: $\sqrt{3}/2$

Question 7

$\sqrt{3}/2$ oe **B1**

Answer: $\sqrt{3}/2$

Question 8

$\sqrt{3}$ cao **B1**

Answer: $\sqrt{3}$

Question 9

$\sqrt{3}/3$ cao (a = 3, b = 3); rationalised form required for the mark **B1**

Answer: $\sqrt{3}/3$

Question 10

1 cao **B1**

Answer: 1

Question 11

0 cao **B1**

Answer: 0

Question 12

1 cao **B1**

Answer: 1

Question 13

sin(45) = EF/DF or equivalent correct trig equation set up **M1**

DF = 6 / ($\sqrt{2}/2$) rationalised to $12/\sqrt{2}$ or equivalent **M1**

DF = $6\sqrt{2}$ cm cao **A1**

Answer: DF = $6\sqrt{2}$ cm

Question 14

exact value of cos 30 = $\sqrt{3}/2$ **B1**

exact value of tan 0 = 0 **B1**

correct product **M1**

0 oe **A1**

Answer: 0

Question 15

45 degrees **B1**

Answer: 45 degrees

Question 16

sin60 = $\sqrt{3}/2$ and cos60 = 1/2 substituted **M1**

$(\sqrt{3} + 1)/2$ oe cao **A1**

Answer: $(\sqrt{3} + 1)/2$

Question 17

recognise $\sqrt{3}/3$ (or $1/\sqrt{3}$) as an exact tangent value **M1**

x = 30 cao, with reason tan30 = $\sqrt{3}/3$ **A1**

Answer: x = 30

Question 18

(a) tan(60) = AM/5 or equivalent correct trig equation using right triangle ABM **M1**

(a) AM = 5 x tan(60) with tan60 = $\sqrt{3}$ substituted **M1**

(a) AM = $5\sqrt{3}$ cm cao **A1**

(a) Answer: $5\sqrt{3}$ cm

(b) Area = 1/2 x 10 x $5\sqrt{3}$ ft their AM from part (a) **M1**

(b) Area = $25\sqrt{3}$ cm^2 cao **A1**

(b) Answer: $25\sqrt{3}$ cm^2

Question 19

sin45 = $\sqrt{2}/2$ and cos45 = $\sqrt{2}/2$ substituted, giving $\sqrt{2}/2 + \sqrt{2}/2$ **M1**

simplification to $\sqrt{2}$ before squaring **M1**

$(\sqrt{2})^2 = 2$ cso, answer given **A1**

Answer: 2

Question 20

opposite = $4\sqrt{3}$ x sin(30) set up **M1**

opposite = $2\sqrt{3}$ cm cao **A1**

adjacent = $4\sqrt{3}$ x cos(30) set up, using cos30 = $\sqrt{3}/2$ **M1**

adjacent = 6 cm cao, from $4\sqrt{3}$ x $\sqrt{3}/2 = 4$ x 3/2 **A1**

perimeter = $6 + 6\sqrt{3}$ cm cao (P mark for correct exact form) **A1**

Answer: $6 + 6\sqrt{3}$ cm

© Revision Library | revisionlibrary.co.uk

Question 21

writes $1/(\tan 30) = 1/(\sqrt{3}/3)$, or equivalently $\cos 30/\sin 30 = (\sqrt{3}/2)/(1/2)$	**M1**
simplifies to $\sqrt{3}$ cso, answer given	**A1**
squares $1/(\tan 30)$ to get $(\sqrt{3})^2 = 3$	**M1**
squares $\tan 60$ to get $(\sqrt{3})^2 = 3$	**M1**
6 cao	**A1**

Answer: $1/(\tan 30) = \sqrt{3}$ (shown); $(1/(\tan 30))^2 + (\tan 60)^2 = 6$

© Revision Library | revisionlibrary.co.uk