

21 Today #5
Brief Answers

GCSE Mathematics
Twenty-One Today

Answer 1

$$\tan \theta = \frac{32}{20} \Rightarrow \theta = 58^\circ$$

[1 mark]

Answer 2

(i)

+	1	2	3	4
1	2	3	4	5
2	3	4	5	6
3	4	5	6	7
4	5	6	7	8

[1 mark]

(ii) $p(5) = \frac{4}{16} = \frac{1}{4}$

[1 mark]

Answer 3

$$vsf = \frac{450}{3600} = \frac{1}{8} \Leftrightarrow lsf = \frac{1}{2} \quad \text{So height of small can is 10 cm}$$

[2 marks]

Answer 4

(i) $(x + 6)^2 = x^2 + 12x + 36$

[1 mark]

(ii) $(x + 6)^2 = x^2$
 $x^2 + 12x + 36 = x^2$
 $12x + 36 = 0$
 $x = -3$

[2 marks]

Answer 5

$$y - 5x = 8 \Leftrightarrow y = 5x + 8 \Rightarrow m = 5$$

[1 mark]

Answer 6

$$t = \frac{8 - 3k^2}{5}$$

$$5t = 8 - 3k^2$$

$$3k^2 = 8 - 5t$$

$$k^2 = \frac{8 - 5t}{3}$$

$$k = \pm \sqrt{\frac{8 - 5t}{3}}$$

[2 marks]**Answer 7**

(i) $\text{Time} = \frac{\text{Distance}}{\text{Speed}} = \frac{5000}{400} = 12.5 \text{ seconds}$

[1 mark]

(ii) You would not hear it coming as the speed of sound is 340 m/s which is less than the 400 m/s the missile is travelling at.

[1 mark]**Answer 8**

(i) $\overrightarrow{OE} = 2a$ (ii) $\overrightarrow{DA} = -b$
 (iii) $\overrightarrow{CE} = -2b + 2a$ (iv) $\overrightarrow{BE} = -b + 2a$

[2 marks]**Answer 9**

Amy's three parts are £225. Each part is worth £75. The 15 parts total is £1125.

[1 mark]**Answer 10**

(i) $pqr = 6 \times (-9) \times \frac{1}{3} = -18$
 (ii) $\frac{pq}{r} = 6 \times (-9) \div \frac{1}{3} = -54 \times 3 = -162$
 (iii) $\frac{p - q}{pr^2} = \frac{6 - (-9)}{6 \times \frac{1}{9}} = \frac{15 \times 3}{2} = 22.5$

[2 marks]**Answer 11****(i)**

Number of stars	*	**	***	****	*****
Frequency	1	6	8	3	2
	1	12	24	12	10

(ii) $\text{mean} = \frac{1 + 12 + 24 + 12 + 10}{20} = \frac{59}{20} = 2.95 \text{ stars}$

[1, 2 marks]

Answer 12

$$\text{Area } \Delta = \frac{1}{2} \times \text{Base} \times \text{Height}$$

$$\text{Area } \square = 4 \times \frac{1}{2} \times 5 \times 5 = 50 \text{ cm}^2$$

[2 marks]**Answer 13**

$$y = \frac{k}{x^2}$$

$$48 = \frac{k}{5^2}$$

$$k = 1200 \Rightarrow y = \frac{1200}{x^2}$$

[1 mark]**Answer 14**

$$7 \leq x^2 + 3 < 28$$

$$4 \leq x^2 < 25$$

$$x = \pm 2, \pm 3, \pm 4$$

[2 marks]**Answer 15**

Get the perpendicular distance between the parallel sides, h ,

$$h = 6 \sin 30^\circ$$

$$= 3$$

Let the parallel sides have lengths of $2k$ and $3k$.

$$\text{Area Trapezium} = \frac{1}{2} \text{ sum of parallel sides} \times \text{distance in between}$$

$$66 = \frac{1}{2} (2k + 3k) \times 3$$

$$44 = 5k$$

$$k = 8.8$$

$$\text{length } AB = 2$$

$$= 17.6 \text{ cm}$$

[4 marks]**Answer 16**

$$x^2 = 16x - 48$$

$$x^2 - 16x + 48 = 0$$

$$(x - 4)(x - 12) = 0$$

$$\text{Either } x = 4 \text{ or } x = 12$$

[2 marks]

Answer 17

$$\left(\frac{2\sqrt{x}}{3y^3} \right)^2 = \frac{4x}{9y^6}$$

[1 mark]

Answer 18

$$\begin{aligned} p(\text{same colour pair}) &= p(\text{red, red}) + p(\text{blue, blue}) \\ &= \frac{5}{12} \times \frac{4}{11} + \frac{7}{12} \times \frac{6}{11} \\ &= \frac{20}{132} + \frac{42}{132} \\ &= \frac{62}{132} \\ &= \frac{31}{66} \quad (\text{About } 0.470) \end{aligned}$$

[2 marks]

Answer 19

Let the purchase price of the house be x pounds.

$$x \times 1.08 = 400000$$

$$x = \text{£}370370$$

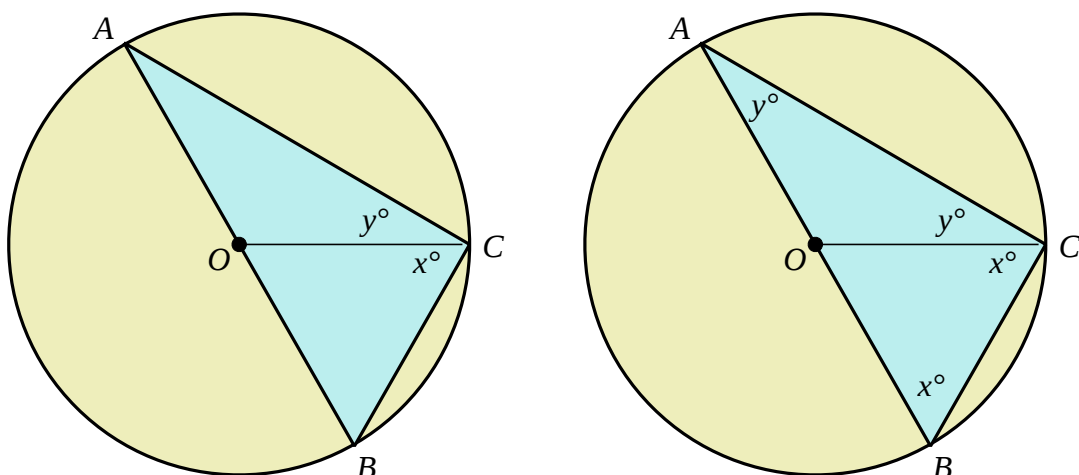
[1 mark]

Answer 20

$$\frac{12}{52} \times \frac{11}{51} \times \frac{10}{50} \times \frac{9}{49} = \frac{99}{54145} \quad (\text{About } 0.00183)$$

[1 mark]

Answer 21



Let $\angle OCB$ be x° and let $\angle OCA$ be y° as shown above, left.

As $\triangle OCB$ and $\triangle OCA$ are isosceles

$\angle OBC$ is x° and $\angle OAC$ is y° as shown, above right.

At the centre $\angle BOC$ is $180 - 2x$ and $\angle AOC$ is $180 - 2y$

Now, angles about a line must sum to 180° and so,

$$180 - 2x + 180 - 2y = 180$$

$$180 = 2x + 2y$$

$$x + y = 90^\circ$$

$$\angle ACB = 90^\circ \quad \square$$

[3 marks]