21 Today #3
Brief Answers

GCSE Mathematics
Twenty-One Today

Answer 1

$$\text{Area shaded} = \frac{1}{4} \times \pi \times 20^2 - \frac{1}{2} \times \pi \times 10^2$$
$$= 100\pi - 50\pi$$
$$= 50\pi$$
$$\therefore \frac{\text{area of shaded region}}{\text{area of square}} = \frac{50\pi}{20 \times 20}$$
$$= \frac{\pi}{8} \qquad \square$$

[4 marks]

Answer 2

$$\frac{35}{21} = 1\frac{2}{3} \text{ minutes}$$
$$= 1 \text{ minute, } 40 \text{ seconds}$$

[1 mark]

Answer 3

Multiply the upper equation by 3 to get,

$$9x - 3y = 21$$
$$\text{ADD} \quad 4x + 3y = 31$$
$$\text{———————————}$$
$$13x = 52 \qquad \therefore x = 4 \text{ and } y = 5$$

[3 marks]

Answer 4

$$(2x + 3)(5x + 1)(x + 1) = (10x^2 + 17x + 3)(x + 1)$$
$$= 10x^3 + 17x^2 + 3x$$
$$+ 10x^2 + 17x + 3$$
$$= 10x^3 + 27x^2 + 20x + 3$$

[3 marks]

Answer 5

$$\sqrt{50} < x \leqslant \sqrt{100}$$
$$7.07... < x \leqslant 10$$
$$x = 8,\ 9,\ 10$$

[1 mark]

Answer 6

(i) Gradient, $m = 3$ **(ii)** $(0,\ 2)$ **(iii)** $\left(-\frac{2}{3},\ 0\right)$

[1, 1, 1 marks]

Answer 7

$$\frac{5 - x}{2} = 2x - 7$$

$$5 - x = 4x - 14$$

$$5x = 19$$

$$x = \frac{19}{5} \quad \text{(As a decimal, } x = 3.8\text{)}$$

[3 marks]

Answer 8

$$x^2 + 6x - 7 = \left[x^2 + 6x \right] - 7$$

$$= \left[(x + 3)^2 - 9 \right] - 7$$

$$= (x + 3)^2 - 16$$

[2 marks]

Answer 9

$hcf\{30,\ 42\} = 6$

[1 mark]

Answer 10

$$lcm\{12,20\} = \frac{12 \times 20}{hcf\{12,\ 20\}}$$

$$= \frac{12 \times 20}{4}$$

$$= 60$$

[1 mark]

Answer 11

$$\text{Percentage loss} = \frac{850 - 697}{850} \times 100$$

$$= 18\,\%$$

[1 mark]

Answer 12

$$\frac{2x^2 + 1}{x^2 - 5} = 3$$

$$2x^2 + 1 = 3x^2 - 15$$

$$x^2 = 16$$

$$x = \pm 4$$

[3 marks]

Answer 13

Two parts are 26 Smarties

So one part is 13, and so there are $5 \times 13 = 65$ Smarties in the tube.

[1 mark]

Answer 14

(a)

Colour	red	blue	green	pink
Probability	0.05	0.15	0.5	0.3

[1 mark]

(b) 15% is 18 counters

$$\therefore \ 100\% \ = \ \frac{18}{15} \ \times \ 100 \ = \ 120 \text{ counters in the bag}$$

[2 marks]

Answer 15

1, 2, 3, 5, 5

[1 mark]

Answer 16

$$y \ = \ k\,x^2$$

$$200 \ = \ k \ \times \ 5^2$$

$$k \ = \ 8 \qquad \text{Equation} : y \ = \ 8\,x^2$$

[1 mark]

Answer 17

1331 cm^3

[1 mark]

Answer 18

$$(3x \ - \ 1)^2 \ = \ 9\,x^2 \ - \ 6x \ + \ 1$$

[1 mark]

Answer 19

$$2x \ + \ 3 \ = \ \frac{x \ - \ 3}{2}$$

$$4x \ + \ 6 \ = \ x \ - \ 3$$

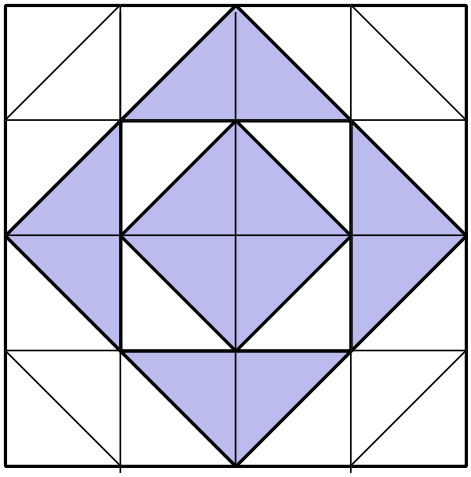
$$3x \ = \ -9$$

$$x \ = \ -3$$

[2 marks]

Answer 20

One way to "see" the answer is to chop up the diagram into congruent shapes.



The fraction shaded is then,

$$\frac{12}{32} = \frac{3}{8}$$

[2 marks]

Answer 21

$$p(\text{A}\clubsuit\text{A}\diamondsuit\text{A}\heartsuit\text{A}\spadesuit) = \frac{4}{52} \times \frac{3}{51} \times \frac{2}{50} \times \frac{1}{49}$$

$$= \frac{1}{270725} \qquad \text{(Approximately 0.0004\% likely)}$$

[2 marks]