Twenty-One Today #3

You have thirty-five minutes to answer 21 questions

Marks Available : 40

GCSE Mathematics
Twenty-One Today

Question 1

The diagram shows a square *ABCD* with sides of length 20 cm
It also shows a semicircle and an arc of a circle.

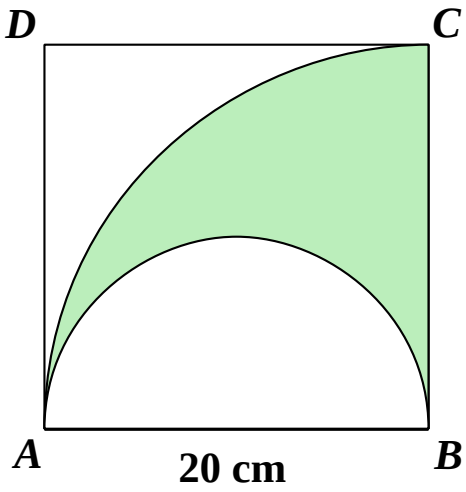


Diagram NOT accurately drawn

AB is the diameter of the semicircle.
AC is an arc of a circle with centre *B*
Show that,

$$\frac{\text{area of shaded region}}{\text{area of square}} = \frac{\pi}{8}$$

[4 marks]

Question 2

If you have thirty-one and a half minutes in which to answer 21 questions, how long does that give you, on average, to answer each question ?
Give your answer in minutes and seconds.

[1 mark]

Question 3

Solve the following pair of simultaneous equations:

$$3x - y = 7$$

$$4x + 3y = 31$$

[3 marks]

Question 4

Expand the brackets and simplify ;

$$(2x + 3)(5x + 1)(x + 1)$$

[3 marks]

Question 5

If x is an integer and $\sqrt{50} < x \leqslant \sqrt{100}$ list the possible values of x.

[1 mark]

Question 6

The algebraic equation $y = 3x + 2$ can be thought of as the description of a straight line.
When thought of in this way,

(i) What is the gradient of this straight line ?

[1 mark]

(ii) What are the coordinates of the point where this line crosses the y-axis ?

[1 mark]

(iii) What are the coordinates of the point where this line crosses the x-axis ?

[1 mark]

Question 7

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

[3 marks]

Question 8

Write $x^2 + 6x - 7$ in the form $(x + a)^2 + b$ where a and b are integers.

[2 marks]

Question 9
Find the Highest Common Factor of 30 and 42

[1 mark]

Question 10
Find the Lowest Common Multiple of 12 and 20

[1 mark]

Question 11
Freddie buys an iPad for £850
He then sells it for £697
Calculate his percentage loss.

[1 mark]

Question 12

$$f(x) = \frac{2x^2 + 1}{x^2 - 5}$$

Find the two values of x for which $f(x) = 3$

[3 marks]

Question 13
Liv and Maddie share a tube of Smarties in the ratio 2 : 3.
If Liv then has 26 Smarties, how many Smarties were in the tube ?

[1 mark]

Question 14

In a bag there are only red counters, blue counters, green counters and pink counters.
A counter is going to be taken at random from the bag.
The table shows the probabilities of taking a red or a blue counter.

Colour	red	blue	green	pink
Probability	0.05	0.15	...	...

The probability of taking a green counter is 0.2 more than the probability of taking a pink counter.

(a) Complete the table.

[1 mark]

There are 18 blue counters in the bag.

(b) Work out the total number of counters in the bag.

[2 marks]

Question 15

Write down one set of five integers that has a mode of 5 and a median of 3.

[1 mark]

Question 16

Given that y is directly proportional to the square of x and that y is 200 when x is 5, write down an equation connecting y and x which is of the form $y = k x^2$, where k is the constant of the proportionality which is to be determined.

[1 mark]

Question 17

One face of a cube has an area of $121 cm^2$.
What is the volume of the cube ?

[1 mark]

Question 18

Expand the brackets,

$$(3x - 1)^2$$

[1 mark]

Question 19

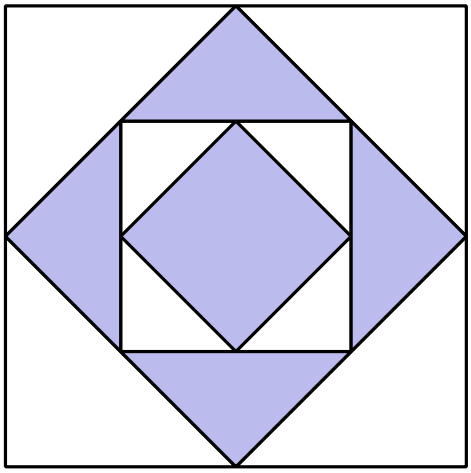
$$f(x) = 2x + 3$$

Find the value of x for which $f(x) = f^{-1}(x)$

[2 marks]

Question 20

What fraction of the area of the larger square is shaded ?



[2 marks]

21 Today !

From a standard pack of 52 playing cards four are randomly chosen, one after the other WITHOUT REPLACEMENT.

What is the probability that all four cards are Aces ?

[2 marks]