GCSE Maths Grade 9 Paper 1 Revision Warm-up: Questions

Question 1

Solve the simultaneous equations $0.3x + 0.2y = 2.1$ and $x - y = 4$.

Question 2

$(x + a)(x - 3) + b \equiv x^2 + 2x - 11$.
Find a and b.

Question 3

Rationalise and simplify $\frac{6}{\sqrt{5}-\sqrt{2}}$.

Question 4

The line $3x + 4y = 24$ crosses the axes at A and B.
Work out the area of triangle OAB.

Question 5

A bag has red and blue counters.
$P(\text{red}) = \frac{1}{2}$.
Two counters are chosen without replacement and $P(\text{both red}) = \frac{2}{9}$. How many counters were in the bag at first?

Question 6

Evaluate $\frac{(3.6\times10^5)(4\times10^{-3})}{8\times10^2}$.
Give your answer in standard form.

Question 7

A rectangle has length 8.0 cm and width 2.0 cm, each to 1 decimal place.
Find the upper bound for its perimeter.

Question 8

Work out the coordinates of the turning point of $y = x^2 - 1.2x + 0.11$.

Question 9

A metal has density 7.8 g/cm^3.
A cuboid of the metal measures 2.5 cm by 4 cm by 0.6 cm.
Find its mass, giving your answer in grams.

Question 10

The line $y = mx + 5$ is tangent to the circle $x^2 + y^2 = 20$.
Find the possible values of m.

Question 11

For events F and S, $P(F) = \frac{3}{5}$, $P(S) = \frac{8}{15}$, and $P(F \cup S) = \frac{5}{6}$.
Find $P(F \cap S')$.

Question 12

On a histogram, $0 < x \leq 4$ has frequency density 2.5, $4 < x \leq 10$ has frequency 9, and the total frequency for $0 < x \leq 14$ is 31.
Find the frequency density for $10 < x \leq 14$.

Question 13

In a group, 40% of the people are boys.
25% of the boys and 50% of the girls study music.
There are 18 more girls than boys who study music.
Work out the number of people in the group.

Question 14

The points $A(-2, 5)$, $B(10, -1)$ and $C(k, 2)$ are collinear.
Find k.

Question 15

Solve $y = x + 3$ and $xy = 10$.

Question 16

The gradient of the line joining $A(2, k)$ and $B(k, 8)$ is -2.
Find k.

Question 17

A polygon has one exterior angle of $72°$. Each of its other exterior angles is $24°$.
Work out the number of sides of the polygon.

Question 18

An iteration $x_{n+1} = \frac{1}{2}\left(x_n + \frac{18}{x_n}\right)$ converges to a positive fixed point x; find x, giving your answer in exact form.

Question 19

$f(x) = x^2 - 3x$.
Given that $f(a) = f(a + 4)$, work out the value of a.

Question 20

The equation $x^2 + kx + 25 = 0$ has exactly one solution.
Find all positive values of k.

Question 21

Point P lies on AB, where $A(-2, 5)$, $B(10, -1)$, and $AP : PB = 1 : 3$.
Find the coordinates of P.

Question 22

After a 12.5% decrease, a price is £70.
Find the original price.

Question 23

A geometric sequence has $u_2 = 1.2$ and $u_5 = 32.4$.
The common ratio is positive.
Find u_4.

Question 24

The mean of n numbers is 6.4.
When 10.9 is added, the mean becomes 6.7.
Work out the value of n.

Question 25

Solve $3^{x+1} + 3^x = 36$.

Question 26

Triangle ABC has $AB = 6$ cm, $AC = 12$ cm and $\angle ABC = 90°$.
Work out the area of triangle ABC, giving your answer in exact form.

Question 27

Two similar solids have surface areas in the ratio $9 : 16$.
The larger volume is 296 cm^3 greater than the smaller volume.
Find the larger volume.

Question 28

Solve $x^2 - 0.7x + 0.1 < 0$.

Question 29

Triangle ABC has $\angle BAC = 30°$, $\angle ABC = 45°$ and $BC = 4$.
Find AC, giving your answer in exact form.

Question 30

Triangle ABC has $AB = 3.6$ cm, $BC = 5$ cm and $\angle ABC = 30°$.
Find the area of the triangle.

Question 31

A set of data has lower quartile 3.2 and interquartile range 4.6.
Every value is multiplied by 2.
Find the new upper quartile.

Question 32

The area of a semicircle is 50π.
Work out the perimeter of the semicircle, giving your answer in exact form.

Question 33

Triangle ABC has $AB = 7$ cm, $BC = 9$ cm and $\angle ABC = 60°$.
Find AC, giving your answer in exact form.

Question 34

A line segment has endpoints $A(-3, 4)$ and $B(5, 0)$.
It is enlarged by scale factor $-\frac{1}{2}$, centre $(0, 0)$.
Find the image of the midpoint of AB.

Question 35

Solve $\frac{2}{x-1} + \frac{3}{x+1} = 4$, giving your answers in the form $\frac{a \pm \sqrt{b}}{c}$.

Question 36

A price is increased by 20% then decreased by 20%.
The final price is £144.
Find the original price.

Question 37

A sector has radius 6 cm.
Its area is equal to the area of a semicircle with radius 4 cm.
Find the angle of the sector.

Question 38

For $f(x) = \frac{x+1}{x-2}$, find $f(f(x))$.

Question 39

A pressure of 2.4 N/cm^2 acts on an area of 0.75 cm^2.
Find the force.

Question 40

y is proportional to $\frac{x^2}{z}$.
When $x = 1.5$, $z = 0.6$, $y = 7.5$.
Find y when $x = 0.9$ and $z = 0.3$.

Question 41

A quadratic graph has roots 3 and -5, and passes through $(1, -24)$.
Find its equation.

Question 42

The roots of $x^2 + px + q = 0$ are $2 + \sqrt{3}$ and $2 - \sqrt{3}$.
Find p and q.

Question 43

The difference between the squares of two consecutive positive odd integers is 64.
Find the integers.

Question 44

The equation $x^2 + px + 12 = 0$ has integer roots.
The difference between the roots is 1.
Find the possible values of p.

Question 45

Given $a : b = 2 : 5$ and $b : c = 3 : 4$, and $a + c = 78$, work out b.

Question 46

A mass m is 5.0 kg to 1 decimal place.
Give the error interval for $\frac{1}{m}$, using fractions.

Question 47

If $\tan\theta = \frac{3}{4}$, find $\sin\theta$ for acute θ.

Question 48

Given $f(x) = \frac{2x-1}{x+3}$, find $f^{-1}(x)$, giving your answer as a single fraction.

Question 49

Find n if $8^{n-1} = 32^{2n+1}$.

Question 50

Make x the subject of $y = \frac{x+a}{x-a}$.

Question 51

In a capture-recapture estimate, t fish are tagged.
Later, 48 fish are caught and 6 are tagged.
The estimated population is 210 more than t.
Find t.

Question 52

Solve the simultaneous equations $x^2 + y^2 = 25$ and $y = 2x - 5$.

Question 53

A sequence has $u_{n+2} = u_{n+1} + u_n$, with $u_3 = 7$ and $u_4 = 11$.
Find u_1.

Question 54

A line passes through $(6, -1)$ and is perpendicular to $3x - 2y = 8$.
Work out the y-intercept of the line.

Question 55

A straight line makes an angle of $150°$ with the positive x-axis.
Find its gradient in exact form.

Question 56

A sector has arc length 5π cm and perimeter $26 + 5\pi$ cm; find its area, giving your answer in terms of π.

Question 57

A sequence has $u_n = an^2 + bn$.
Given $u_3 = 21$ and $u_5 = 55$, find u_4.

Question 58

Solve $2\cos x = 1$ for $0° \leq x \leq 360°$.

Question 59

In a bag of counters, $R : B = 3 : 5$ and $B : G = 2 : 1$.
There are 33 counters that are not blue.
Work out the total number of counters.

Question 60

The HCF of $2^a \cdot 3^4 \cdot 5$ and $2^3 \cdot 3^b \cdot 5^2$ is $2^2 \cdot 3^2 \cdot 5$.
Find the least possible value of $a + b$.

Question 61

Write $0.\dot{1}2\dot{3}$ as a fraction in its simplest form.

Question 62

A, B, C, D are in order on a circle.
If $\angle ABC = 112°$ and $\angle ACD = 34°$, find $\angle ADC$.

Question 63

Simplify $\frac{2}{x+1} - \frac{3}{x-2}$, giving your answer as a single fraction.

Question 64

Find the coefficient of x in $(x-2)(x+3)(2x-1)$.

Question 65

A cube has volume 0.000064 m^3.
Find its side length in cm.

Question 66

A 3-digit code has a prime digit, then a factor of 12, then a square number digit. Repetition is allowed.
How many codes are possible?

Question 67

A cone and a sphere have the same radius r.
The cone has height $6r$.
Find the ratio of the volume of the cone to the volume of the sphere.

Question 68

The 2nd term of a geometric sequence is $2 + \sqrt{3}$.
The 3rd term is $9 + 5\sqrt{3}$.
Work out the 4th term, giving your answer in the form $a + b\sqrt{3}$, where a and b are integers.

Question 69

$\overrightarrow{PQ} = 2a - b$, $\overrightarrow{QR} = a + 3b$, and $\overrightarrow{PS} = ka + 5b$.
Find k so that P, R, S are collinear.

Question 70

A rectangle has sides $x + 2$ and $x - 1$.
Its area is $2x^2 - 5$.
Find x, giving your answer in the form $\frac{a+\sqrt{b}}{2}$.

Question 71

For integer n, simplify $(n+2)^3 - (n-2)^3$, giving your answer in the form $an^2 + b$.

Question 72

$\overrightarrow{OA} = 2a + 3b$ and $\overrightarrow{OB} = 8a + 15b$.
Point P lies on AB with $AP : PB = 1 : 2$.
Find $\overrightarrow{OP}$.

Question 73

A quadratic sequence begins $5,\ 11,\ 21,\ 35, \ldots$. Which term of the sequence is 203?

Question 74

After two successive 10% increases, a price is £60.50.
Find the original price.

Question 75

A cuboid has side lengths 2.4 cm, 3.2 cm and h cm.
The longest diagonal of the cuboid is 5 cm.
Find h.

Question 76

A sector has arc length 3π cm and area 18π cm^2.
Find its radius.

Question 77

Simplify $\frac{(27x^6)^{2/3}}{3x}$.

Question 78

A biased coin has $P(H) = 0.6$.
It is tossed twice.
Given that at least one head is thrown, find $P(\text{exactly one head})$.

Question 79

Write $0.\dot{2}\dot{7} + 0.\dot{3}$ as a fraction in its simplest form.

Question 80

From A, B is 8 km away on a bearing of 060°; C is due east of A and due south of B; find AC, giving your answer in exact form.

Question 81

Circle C has centre $(0, 0)$ and radius 13.
Point P lies on C and has x-coordinate 5.
Find the possible equations of the tangent to C at P.

Question 82

Simplify $(2 + \sqrt{5})^2 - (2 - \sqrt{5})^2$.

Question 83

A tangent to $x^2 + y^2 = 25$ has gradient $-\frac{3}{4}$.
Find the possible y-coordinates of the point where the tangent touches the circle.

Question 84

A speed-time graph rises uniformly from 1.2 m/s to 4.8 m/s in 5 seconds, then falls uniformly to 0 in 2 seconds.
Find the total distance travelled.

Question 85

Two positive numbers are in the ratio 2 : 3.
Their squares differ by 45.
Find the numbers.

Question 86

Given that $2^m = 8^n$ and $m + n = 12$, work out m.

Question 87

In triangle ABC, M and N are the midpoints of AB and AC.
If $\overrightarrow{BC} = 6a - 4b$, find $\overrightarrow{MN}$.