1.1 Number & Algebra Toolkit

Question Paper

Course	DP IB Maths
Section	1. Number & Algebra
Topic	1.1 Number & Algebra Toolkit
Difficulty	Medium

Time allowed: 80

Score: /59

Percentage: /100

Question 1a

Let $Q = \frac{30 \sin 2a}{8b}$, where $a = 45°$ and $b = 2$.

(a) Calculate the exact value of Q.

[2 marks]

Question 1b

(b) Give your answer from part (b) correct to

(i) two decimal places

(ii) two significant figures.

[2 marks]

Question 2a

Let $R = \frac{4x}{6 \cos 5y}$, where $x = 1.25$ and $y = 36°$.

(a) Write the angle of y in radians.

[1 mark]

Question 2b

(b) Find the value of R. Give your answer as a fraction.

[2 marks]

Question 2c

(c) Give your answer from part (b) to

(i) one decimal place

(ii) three significant figures.

[2 marks]

Question 3a

Consider the numbers $a = 4.14 \times 10^{6}$ and $b = 2.54 \times 10^{-7}$.

(a) Calculate $C = \sqrt[10]{\left(\frac{a}{b}\right)^{3}}$. Give your answer correct to the

(i) nearest integer

(ii) three significant figures.

[3 marks]

Question 3b

(b) Give your answer to part (a) (i) in the form $a \times 10^k$, where $1 \leq a \leq 10$ and $k \in \mathbb{Z}$.

[2 marks]

Question 4a

A cylinder has radius of 12.7 cm and height of 14.4 cm.

(a) Calculate the volume of the cylinder correct to

(i) one decimal place

(ii) three significant figures

(iii) the nearest integer.

[3 marks]

Question 4b

(b) Write your answer to part (a) (ii) in the form $a \times 10^k$, where $1 \leq a \leq 10$ and $k \in \mathbb{Z}$.

[2 marks]

Question 5a

A rectangular field has length, L, of 25.2 m and width, W, of 21.4 m, each correct to 1 decimal place.

(a) Calculate the lower and upper bound for

(i) L

(ii) W.

[2 marks]

Question 5b

(b) Calculate the lower and upper bound for the

(i) perimeter, P

(ii) area, A, of the field.

[4 marks]

Question 6

Calculate the following, giving your answer in the form $a \times 10^k$, where $1 \leq a \leq 10$ and $k \in \mathbb{Z}$.

(i) $4 \times (6.2 \times 10^{-5})$

(ii) $(4 \times 10^5) - (5 \times 10^4)$

(iii) $(4321^{-1})(1.2 \times 10^{-1})$.

[6 marks]

Question 7a

Consider the following four numbers.

$$a = 0.272 \quad b = 0.0272 \times 10^5 \quad c = e(10e)^{-1} \quad d = 2.72 \times 10^2$$

(a) Write down

(i) the number that is in the form $a \times 10^k$, where $1 \leq a \leq 10$ and $k \in \mathbb{Z}$

(ii) the largest of these numbers.

[2 marks]

Question 7b

(b) (i) Find the value of $a + b - c + d$.

(ii) Give your answer to part (b)(i) in the form $a \times 10^k$, where $1 \leq a \leq 10$ and $k \in \mathbb{Z}$.

[4 marks]

Question 8

Solve the following systems of linear equations using technology.

(i)

$$2x - 5y + z = 10$$
$$3x + 3y - 2z = 1$$
$$x + y + z = 2$$

(ii)

$$x - 4y + 2z = -13$$
$$5x - 4y + 3z = 17$$
$$2x - 5y - z = -18$$

(iii)

$$5y + 5z = 20$$
$$x + 2y - z = -12$$
$$7x - 4z = -4$$

[9 marks]

Question 9a

(a) Write $\frac{3}{x^2+5x+4}$ as a sum of partial fractions.

[2 marks]

Question 9b

(b) Write $\frac{9-x}{x^2+3x-10}$ as a sum of partial fractions.

[3 marks]

Question 9c

(c) Write $\frac{3x-23}{2x^2-5x-12}$ as a sum of partial fractions.

[3 marks]

Question 10

Write $\frac{33-12x}{(x+1)(x-2)^2}$ as the sum of partial fractions in the form $\frac{A}{x+1}+\frac{B}{x-2}+\frac{C}{(x-2)^2}$.

[5 marks]