

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 la

Let
$$Q = \frac{30 \sin 2a}{8b}$$
, where $a = 45^{\circ}$ 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 $y = 36^{\circ}$.

(a) Write the angle of y in radians.

[1 mark]

Question 2b

(b) Find the value of $\it R$. 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]

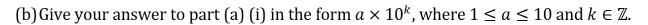
Question 3a

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



[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 $1 \le a \le 10$ 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 $1 \le a \le 10$ 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.

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

- (a) Write down
 - (i) the number that is in the form $a \times 10^k$, where $1 \le a \le 10$ 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 $1 \le a \le 10$ 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]