

Name: .....

Date: .....

**INSTRUCTIONS TO CANDIDATES****Section A (30 marks)****Time: 45 minutes**

1. Answer all the questions in this section.
2. Calculators may **not** be used in this section.
3. All working must be clearly shown. Omission of essential working will result in loss of marks.
4. The marks for each question is shown in brackets [ ] at the end of each question.

- 
- 1 Round off 23.086 correct to
- (a) one significant figure,
  - (b) two decimal places,
  - (c) the nearest integer.

Answer (a) ..... [1]

(b) ..... [1]

(c) ..... [1]

- 
- 2 (a) Express correct to three significant figures
- (i) 0.008186,
  - (ii) 62 659.
- (b) Express 496 mm in cm, giving your answer correct to the nearest cm.

Answer (a) (i) ..... [1]

(ii) ..... [1]

(b) ..... cm [1]

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3 Estimate the values of

(a)  $54.96703 - 18.24075$ ,

(b)  $\frac{40}{0.00496}$

correct to one significant figure.

Answer (a) ..... [1]

(b) ..... [1]

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4 (a) Express \$615.90 correct to the nearest ten dollars.

(b) Estimate 8.03454 correct to three significant figures and state the number of decimal places in the result.

(c) Find the value of  $(10\pi - 18.93)$ , giving your answer correct to two significant figures. [Take the value of  $\pi$  to be 3.14159.]

Answer (a) \$ ..... [1]

(b) ..... ,  
..... decimal places [1]

(c) ..... [1]

- 5 Write 367.0457 correct to  
 (a) two decimal places,  
 (b) four significant figures,  
 (c) the nearest hundred.

Answer (a) ..... [1]

(b) ..... [1]

(c) ..... [1]

- 6 Estimate each of the following, giving your answer correct to one significant figure.

(a)  $19.98 \times 30.03 - 59.84$

(b)  $\frac{48.12}{1.61}$

(c)  $\frac{251.6 \times 11.94}{18.75 + 5.039}$

(d)  $\sqrt{\frac{7.998 \times 24.99}{2.012}}$

Answer (a) ..... [1]


(b) ..... [1]

(c) ..... [1]

(d) ..... [1]

- 7 Part of Mrs Lee's grocery shopping receipt is shown below.
- (a) Complete the column in the table for the estimated cost of each item, giving your answer correct to the nearest dollar.
- (b) If Mrs Lee paid using a \$100 note, estimate the amount of change she would receive, giving your answer correct to the nearest dollar.

Answer (a)

 <b>ABC Grocery Store</b>		Estimated Cost (Nearest dollar)
Rice	\$34.59	\$
Milk powder	\$25.63	\$
Chocolates	\$8.40	\$
Flour	\$2.04	\$
Cooking oil	\$19.75	\$
GST	\$4.52	\$
Total		

[2]

Answer (b) \$ ..... [2]

8 (a) Estimate the value of  $\frac{15.89}{4.03}$ , giving your answer correct to one significant figure.

(b) Use your answer from part (a) to estimate the value of  $\frac{15\ 890}{0.0403}$ .

Answer (a) ..... [1]

(b) ..... [1]

9 (a) Express correct to two significant figures

(i) 0.03035, (ii) 269.81.

(b) Hence estimate correct to one significant figure

(i)  $0.03035 \times 269.81$ ,

(ii)  $\frac{269.81}{0.03035}$ .

Answer (a) (i) ..... [1]

(ii) ..... [1]

(b) (i) ..... [1]

(ii) ..... [1]

- 10 An electronics supplier paid \$19 million for 94 867 CD players.
- (a) Write 94 867 correct to two significant figures.
  - (b) Use your answer from part (a) and the information given above to estimate the cost, in dollars paid by the supplier for each CD player. (Assume that the cost of each CD player is the same.)

Answer (a) ..... [1]

(b) \$ ..... [1]

## INSTRUCTIONS TO CANDIDATES

### Section B (30 marks)

Time: 45 minutes

1. Answer **all** the questions in this section.
2. Calculators may be used in this section.
3. All working must be clearly shown. Omission of essential working will result in loss of marks.
4. The marks for each question is shown in brackets [ ] at the end of each question.

11 Use a calculator to evaluate each of the following, giving your answer correct to three significant figures.

(a)  $8.697 \times [61.8^2 - (-9.5 \div 2.6)] \div 1.28$

(b)  $15.6^3 \div \sqrt[3]{1029} \times \left(19\frac{1}{4}\right)^2 \div \sqrt{212.5}$

(c)  $2\frac{1}{7} - \frac{9\frac{1}{4} - 2\frac{1}{3}}{1\frac{2}{5} + 3\frac{1}{4}}$

(d)  $\frac{11.69^2 \times \sqrt{8.67}}{28.39^3} + \sqrt[3]{\frac{8.17 \times 2.49}{5.69 + 9.99}}$

(e)  $\frac{0.928 \times \sqrt{8.126} - \sqrt[3]{11.05}}{\sqrt[3]{285.9} - 1.087 \times 0.022}$

Answer (a) ..... [1]

(b) ..... [1]

(c) ..... [1]

(d) ..... [2]

(e) ..... [2]

12 (a) Express

- (i) 351.689 correct to the nearest ten,
- (ii) 15.2681 correct to the nearest whole number,
- (iii) 4.997 correct to two significant figures.

(b) Hence estimate correct to one significant figure the value of  $\frac{351.689 \times 15.2681^2}{4.997^3}$ .

(c) Use a calculator to find the value of  $\frac{351.689 \times 15.2681^2}{4.997^3}$ , giving your answer correct to three significant figures.

Answer (a) (i) ..... [1]

(ii) ..... [1]

(iii) ..... [1]


(b) ..... [1]

(c) ..... [1]



- 13 The table below shows the enrolment of the students in different levels of a private school.
- Write the number of students in each level correct to the nearest hundred in the table below.
  - Use your answer from part (a) to write down the total enrolment of the school correct to the nearest thousand.
  - The school held a concert at the end of the year. Each concert ticket cost \$30.
    - Use your answer from part (b) to estimate the total amount of money collected from the sale of tickets if half the students purchased a ticket each.
    - Find the actual total amount of money collected from the sale of tickets if  $\frac{3}{4}$  of the students turned up for the concert, each bringing 3 guests along. Give your answer correct to four significant figures.

Answer (a)

Shenton Private School 		No. of students (Nearest hundred)
Level	No. of students	
Secondary 1	1095	
Secondary 2	1253	
Secondary 3	1570	
Secondary 4	2946	

[2]

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Answer (b) ..... [1]

(c) (i) \$ ..... [1]

(ii) \$ ..... [2]

[1]  
[1]  
[1]  
[1]  
[1]

tion

14 (a) Each of the five students were asked to write down a recurring decimal. The numbers are shown in the table below.

(i) Calculate the sum of the five numbers, giving your answer correct to three decimal places.

(ii) Find the difference between the largest and the smallest number, giving your answer correct to four significant figures.

Anna	89.587
Peter	106.492
June	-2.713
Pauline	16.81
Timothy	55.5

(b) Belinda bought 6 boxes of paper clips at \$1.99 per box, 9 note books at \$3.48 per book and 5 plastic files at \$6.04 per file.

(i) Estimate the total amount Belinda has to pay giving your answer correct to the nearest dollar.

(ii) Calculate the difference between the actual amount and the estimated amount.

Answer (a) (i) ..... [2]

(ii) ..... [1]

(b) (i) \$ ..... [2]

(ii) \$ ..... [1]

- re
- id
- st
- 15 (a) Mrs Rama wants to carpet the floor of her rectangular living room, measuring 4.98 m by 8.032 m. The carpet will cost \$11.79 per square metre. Estimate the amount of money Mrs Rama will need to carpet the floor. Give your answer correct to the nearest hundred dollars.
- (b) The volume of a cuboid is  $56\,489\text{ cm}^3$ . If the dimensions of its base are 24.68 cm and 19.76 cm respectively, estimate the height of the cuboid giving your answer correct to one significant figure.

Answer (a) \$ ..... [3]

(b) ..... cm [3]

15. (a) Height of 1st slug from starting point  
 $= 17\frac{1}{7} - 21\frac{1}{4} + 12\frac{1}{8} - 3\frac{1}{2} = 4\frac{29}{56}$  mm  
 Height of 2nd slug from starting point  
 $= 20\frac{1}{3} - 37\frac{1}{6} + 19 - 23\frac{2}{3} = -21\frac{1}{2}$  mm  
 Distance between both slugs  
 $= 4\frac{29}{56} - \left(-21\frac{1}{2}\right)$   
 $= 4\frac{29}{56} + 21\frac{1}{2}$   
 $= 26\frac{1}{56}$  mm

(b) Difference in temperature in each process  
 $= 11.25^\circ\text{C} - 8.9^\circ\text{C}$   
 $= 2.35^\circ\text{C}$   
 Temperature after  
 1st process:  $-10.75 + 2.35 = -8.4^\circ\text{C}$   
 2nd process:  $-8.4 + 2.35 = -6.05^\circ\text{C}$   
 3rd process:  $-6.05 + 2.35 = -3.7^\circ\text{C}$   
 4th process:  $-3.7 + 2.35 = -1.35^\circ\text{C}$   
 5th process:  $-1.35 + 2.35 = 1^\circ\text{C}$   
 $\therefore$  the process must be repeated **5 times** for the temperature of the chemical to reach  $1^\circ\text{C}$ .

**Test 6: Estimation and Approximation**

**Section A**

1. (a)  $23.086 \approx 20$  (correct to 1 sig. fig.)  
 (b)  $23.086 \approx 23.09$  (correct to 2 d.p.)  
 (c)  $23.086 \approx 23$  (correct to the nearest integer)
2. (a) (i)  $0.008186 \approx 0.00819$  (correct to 3 sig. fig.)  
 not significant

**Teacher's Tip**  
 Zeros preceding the first non-zero digit are not significant.

(ii)  $62\ 6\ 5\ 9 \approx 62\ 700$  (correct to 3 sig. fig.)

If the extra digit is 5 or more, add 1 to the previous digit and replace the extra digits with zeros to keep the place value.

(b)  $496\text{ mm} = \frac{496}{10}\text{ cm} \leftarrow 1\text{ cm} = 10\text{ mm}$   
 $= 49.6\text{ cm}$   
 $\approx 50\text{ cm}$  (correct to the nearest cm)

3. (a)  $54.96703 - 18.24075$   
 $\approx 55 - 18$   
 $= 37$   
 $\approx 40$  (correct to 1 sig. fig.)

(b)  $\frac{40}{0.00496}$   
 $\approx \frac{40}{0.0050}$   
 $= \frac{40\ 000}{5}$   
 $= 8000$  (correct to 1 sig. fig.)

**Teacher's Tip**

To estimate to 1 sig. fig., estimate to 2 sig. fig. in the working and then round off to 1 sig. fig. in the final answer.

4. (a)  $\$615.90 \approx \$620$  (correct to the nearest ten dollars)  
 (b)  $8.03454 \approx 8.03$  (correct to 3 sig. fig.)

Zero between non-zero digits are significant.

8.03 has 2 decimal places.

(c)  $10\pi - 18.93 = 10 \times 3.14159 - 18.93$   
 $\approx 10 \times 3.14 - 18.9$   
 $= 31.4 - 18.9$   
 $= 12.5$   
 $\approx 13$  (correct to 2 sig. fig.)

**Teacher's Tip**

To estimate to 2 sig. fig., estimate to 3 sig. fig. in the working and then round off to 2 sig. fig. in the final answer.

5. (a)  $367.0457 \approx 367.05$  (correct to 2 d.p.)  
 (b)  $367.0457 \approx 367.0$  (correct to 4 sig. fig.)  
 (c)  $367.0457 \approx 400$  (correct to the nearest hundred)
6. (a)  $19.98 \times 30.03 - 59.84$   
 $\approx 20 \times 30 - 60$   
 $= 600 - 60$   
 $= 540$   
 $\approx 500$  (correct to 1 sig. fig.)
- (b)  $\frac{48.12}{1.61} \approx \frac{48}{1.6}$   
 $= \frac{480}{16}$   
 $= 30$  (correct to 1 sig. fig.)

$$\begin{aligned} \text{(c)} \quad & \frac{251.6 \times 11.94}{18.75 + 5.039} \\ & \approx \frac{250 \times 12}{19 + 5.0} \\ & = \frac{250 \times 12}{24} \\ & = 125 \\ & \approx 100 \text{ (correct to 1 sig. fig.)} \end{aligned}$$

$$\begin{aligned} \text{(d)} \quad & \sqrt{\frac{7.998 \times 24.99}{2.012}} \\ & \approx \sqrt{\frac{4.8 \times 25}{2.01}} \\ & = \sqrt{100} \\ & = 10 \text{ (correct to 1 sig. fig.)} \end{aligned}$$

7. (a)

ABC Grocery Store		Estimated Cost (Nearest dollar)
Rice	\$34.59	\$35
Milk powder	\$25.63	\$26
Chocolates	\$8.40	\$8
Flour	\$2.04	\$2
Cooking oil	\$19.75	\$20
GST	\$4.52	\$5
Total		

$$\begin{aligned} \text{(b)} \quad & \text{Estimated total cost} \\ & = \$35 + \$26 + \$8 + \$2 + \$20 + \$5 \\ & = \$96 \text{ (correct to the nearest dollar)} \end{aligned}$$

$$\begin{aligned} & \text{Change received} \\ & = \$100 - \$96 \\ & = \$4 \text{ (correct to the nearest dollar)} \end{aligned}$$

$$\begin{aligned} \text{8. (a)} \quad & \frac{15.89}{4.03} \approx \frac{16}{4.0} \\ & \approx 4 \text{ (correct to 1 sig. fig.)} \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad & \frac{15\,890}{0.0403} = \frac{15.89}{4.03} \times 100\,000 \\ & = 4 \times 100\,000 \\ & = 400\,000 \text{ (correct to 1 sig. fig.)} \end{aligned}$$

$$\frac{15\,890}{0.0403} = \frac{15.89 \times 1000}{4.03 \times \frac{1}{100}}$$

$$\begin{aligned} \text{9. (a)} \quad & \text{(i) } 0.03035 \approx 0.030 \text{ (correct to 2 sig. fig.)} \\ & \text{(ii) } 269.81 \approx 270 \text{ (correct to 2 sig. fig.)} \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad & \text{(i) } 0.03035 \times 269.81 \\ & \approx 0.030 \times 270 \\ & = 8.1 \\ & \approx 8 \text{ (correct to 1 sig. fig.)} \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & \frac{269.81}{0.03035} \approx \frac{270}{0.030} \\ & = \frac{27\,000}{3} \\ & = 9000 \text{ (correct to 1 sig. fig.)} \end{aligned}$$

$$10. \text{ (a) } 94\,867 \approx 95\,000 \text{ (correct to 2 sig. fig.)}$$

$$\begin{aligned} \text{(b)} \quad & \text{Estimated cost of each CD player} \\ & = \frac{\$19\,000.000}{95.000} \\ & = \$200 \end{aligned}$$

### Section B

$$11. \text{ (a) } 8.697 \times [61.8^2 - (-9.5 + 2.6)] \div 1.28 \approx 26\,000 \text{ (correct to 3 sig. fig.)}$$

$$\begin{aligned} \text{(b)} \quad & 15.6^3 \div \sqrt[3]{1029} \times \left(19\frac{1}{4}\right)^2 \div \sqrt{212.5} \\ & \approx 9560 \text{ (correct to 3 sig. fig.)} \end{aligned}$$

$$\begin{aligned} \text{(c)} \quad & 2\frac{1}{7} - \frac{9\frac{1}{4} - 2\frac{1}{3}}{1\frac{2}{3} + 3\frac{1}{4}} \\ & \approx 0.655 \text{ (correct to 3 sig. fig.)} \end{aligned}$$

$$\begin{aligned} \text{(d)} \quad & \frac{11.69^2 \times \sqrt{8.67}}{28.39^2} + \sqrt[3]{\frac{8.17 \times 2.49}{5.69 + 9.99}} \\ & \approx 1.11 \text{ (correct to 3 sig. fig.)} \end{aligned}$$

$$\begin{aligned} \text{(e)} \quad & \frac{0.928 \times \sqrt{8.126} - \sqrt[3]{11.05}}{\sqrt[3]{285.9} - 1.087 \times 0.022} \\ & \approx 0.0637 \text{ (correct to 3 sig. fig.)} \end{aligned}$$

$$12. \text{ (a) (i) } 351.689 \approx 350 \text{ (correct to the nearest 10)}$$

$$\text{(ii) } 15.2681 \approx 15 \text{ (correct to the nearest whole no.)}$$

$$\text{(iii) } 4.997 \approx 5.0 \text{ (correct to 2 sig. fig.)}$$

$$\begin{aligned} \text{(b)} \quad & \frac{351.689 \times 15.2681^2}{4.997^3} \\ & \approx \frac{350 \times 15^2}{5^3} \\ & = \frac{70 \times 3 \times 3}{5 \times 5 \times 5} \\ & = 630 \\ & \approx 600 \text{ (correct to 1 sig. fig.)} \end{aligned}$$

$$\begin{aligned} \text{(c)} \quad & \frac{351.689 \times 15.2681^2}{4.997^3} \\ & \approx 657 \text{ (correct to 3 sig. fig.)} \end{aligned}$$

13. (a)

Shenton Private School		
Level	No. of students	No. of students (Nearest hundred)
Secondary 1	1095	1100
Secondary 2	1253	1300
Secondary 3	1570	1600
Secondary 4	2946	2900

(b) Estimated enrolment  
 $= 1100 + 1300 + 1600 + 2900$   
 $= 6900$   
 $\approx 7000$  (correct to the nearest thousand)

(c) (i) Estimated cost of tickets

$$= \frac{7000}{21} \times \$30^{15}$$

$$= \$105\,000$$

(ii) Total no. of students who attended the concert

$$= \frac{3}{4} \times (1095 + 1253 + 1570 + 2946)$$

$$= 5148$$

Total no. of students and guests  
 $= 4 \times 5148$   
 $= 20\,592$

Actual cost of tickets  
 $= 20\,592 \times \$30$   
 $= \$617\,760$   
 $\approx \$617\,800$  (correct to 4 sig. fig.)

14. (a) (i)  $89.58\dot{7} = 89.5877\dots$   
 $106.49\dot{2} = 106.49292\dots$   
 $-2.71\dot{3} = -2.713713\dots$   
 $16.8\dot{1} = 16.8181\dots$   
 $55.\dot{5} = 55.5555\dots$   
Sum of 5 no.s  
 $= 89.5877\dots + 106.4929\dots + (-2.7137\dots)$   
 $+ 16.8181\dots + 55.5555\dots$   
 $\approx 265.741$  (correct to 3 d.p.)

(ii) Difference  
 $= 106.4929\dots - (-2.7137\dots)$   
 $= 109.2$  (correct to 4 sig. fig.)

(b) (i) Estimated amount  
 $\approx 6 \times \$2 + 9 \times \$3.50 + 5 \times \$6$   
 $= \$73.50$   
 $\approx \$74$  (correct to the nearest dollar)

(ii) Actual amount

$$= 6 \times \$1.99 + 9 \times \$3.48 + 5 \times \$6.04$$

$$= \$73.46$$

Difference  
 $= \$74 - \$73.46$   
 $= \$0.54$

15. (a) Estimated area of rectangular floor

$$\approx 5.0 \times 8.0$$

$$= 40 \text{ m}^2$$

Estimated amount

$$\approx 40 \times \$12$$

$$= \$480$$

$$\approx \$500$$
 (correct to the nearest hundred dollars)

(b) Volume of cuboid = Length  $\times$  Breadth  $\times$  Height

$$\text{Height} = \frac{\text{Volume}}{\text{Length} \times \text{Breadth}}$$

$$\text{Height} = \frac{56\,489}{24.68 \times 19.76}$$

Estimated height  $\approx \frac{56\,000}{25 \times 20}$   
 $= 112$   
 $\approx 100 \text{ cm}$  (correct to 1 sig. fig.)

### Test 7: Basic Algebra

#### Section A

1.  $a = -2, b = -3, c = 2\frac{14}{25}$

$$b^2 - 2a^3 + \sqrt{c}$$

$$= (-3)^2 - 2(-2)^3 + \sqrt{2\frac{14}{25}}$$

$$= 9 - 2(-8) + \sqrt{\frac{64}{25}}$$

$$= 9 + 16 + \frac{8}{5}$$

$$= 25 + 1\frac{3}{5}$$

$$= 26\frac{3}{5}$$

#### Teacher's Tip

To evaluate an expression, just substitute the values of the variables with the given values.

2. (a)  $12x - 15y - 3(6x - 9y)$   
 $= 12x - 15y - 18x + 27y$   
 $= 12x - 18x - 15y + 27y$   
 $= -6x + 12y$

Multiply each term inside the brackets by  $-3$ .