

### Exercise 1.6

- (a) 2.65%  
(b) 7.32%  
(c) 6.11%  
(d) 31.8%
- (a)  $354.78 \text{ cm}^3$   
(b) 3.52%

### Exercise 1.7

- (a) 6 (b) 4 (c) -3  
(d) 6 (e) 0
- (a) 12 500 (b) 3080  
(c) 288 000 000 (d) 0.0421  
(e) 0.00972 (f) 0.00000838
- (a)  $6.21 \times 10^4$  (b)  $2.1 \times 10^3$   
(c)  $9.84 \times 10^7$  (d)  $5.2 \times 10^1$
- (a)  $7.27 \times 10^{-1}$  (b)  $3.19 \times 10^{-2}$   
(c)  $2.57 \times 10^{-6}$  (d)  $4.08 \times 10^{-4}$
- (a)  $398 \times 10^1$ ,  $0.17 \times 10^3$ ,  
 $370 \times 10^2$ ,  $0.02 \times 10^2$   
(b)  $3.98 \times 10^3$ ,  $1.7 \times 10^2$ ,  
 $3.70 \times 10^4$ ,  $2 \times 10^0$   
(c)  $3.8 \times 10^{-5}$ ,  $2.4 \times 10^{-3}$ ,  
 $2 \times 10^0$ ,  $1.2 \times 10^2$ ,  $1.7 \times 10^2$ ,  
 $3.98 \times 10^3$ ,  $3.70 \times 10^4$
- (a)  $3.17 \times 10^{10}$  (b)  $9.89 \times 10^{-2}$   
(c)  $4.56 \times 10^{-9}$  (d)  $1.54 \times 10^{-6}$   
(e)  $8.12 \times 10^4$  (f)  $3.44 \times 10^{-7}$
- (a)  $3.90 \times 10^3$  (b)  $3.90 \times 10^3$   
(c)  $2.65 \times 10^0$  (d)  $5.74 \times 10^6$
- (a) 33 min  
(b) 12 min  
(c) 79 min
- 1270 times (to 3 s.f.)

### Exercise 1.8

- (a) 395 s  
(b) 9 min 22 s  
(c) 3 d 6 h  
(d) 1 h 48 min 20 s  
(e) 17 595 min  
(f) 22 030 s

### Exercise 1.9

1.

| City                              | Miami | Riga | Milan | Bahrain | Lima | Perth | Moscow |
|-----------------------------------|-------|------|-------|---------|------|-------|--------|
| Celsius ( $^{\circ}\text{C}$ )    | 27.8  | -2   | 7     | 18.3    | 25   | 32.2  | -12    |
| Fahrenheit ( $^{\circ}\text{F}$ ) | 82    | 28.4 | 44.6  | 65      | 77   | 90    | 10.4   |

### Exercise 1.10

- (a)  $38 \text{ km h}^{-1}$   
(b) 7.19 h  
(c) 29.3 km
- (a)  $2.625 \text{ km h}^{-1}$   
(b)  $2.64 \text{ km h}^{-1}$ ; faster  
(c)  $2.63 \text{ km h}^{-1}$

### Exercise 1.11

- (a) 3.5 m (b) 2760 mm  
(c) 4.8 km (d) 35 200 cm
- (a) 5800 g  
(b) 0.03 kg  
(c) 1.26 g  
(d) 1 000 000 mg
- (a)  $45 000 \text{ cm}^2$   
(b)  $0.0685 \text{ m}^2$   
(c)  $1.4 \times 10^6 \text{ m}^2$   
(d)  $1.2 \text{ cm}^2$
- (a)  $1.2 \times 10^7 \text{ cm}^3$   
(b)  $0.024 \text{ m}^3$   
(c)  $1300 \text{ mm}^3$   
(d)  $5 \times 10^5 \text{ cm}^3$
- (a) 7.91 (b) 3950 ml  
(c)  $83 300 \text{ cm}^3$  (d)  $687 \text{ cm}^3$
- (a) (i)  $70 000 \text{ cm}^2$   
(ii)  $7 \text{ m}^2$   
(b) (i)  $8.21 \times 10^5 \text{ cm}^3$   
(ii)  $0.821 \text{ m}^3$   
(c)  $33.1 \text{ cm}^2$
- (a) 38 (b) 16 cm
- 1250
- (a) 53 (b)  $20 \text{ cm}^3$
- (a)  $255 \text{ m}^2$  (b)  $20.4 \text{ m}^3$

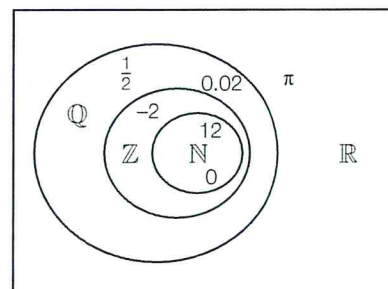
### Mixed examination practice 1

#### Exam-style questions 1

1.

|   |    |                |             |     |
|---|----|----------------|-------------|-----|
|   | 11 | $\frac{1}{11}$ | $\sqrt{11}$ | -11 |
| N | ✓  |                |             |     |
| Z | ✓  |                |             | ✓   |
| Q | ✓  | ✓              |             | ✓   |
| R | ✓  | ✓              | ✓           | ✓   |

2.



- (a) 2, natural number  
(b)  $4\frac{8}{9} = 4.8$ , rational number  
(c) 2, natural number  
(d) 42.7256..., irrational number  
(e) 10, natural number  
(f) -36, integer  
(g)  $-\frac{101}{3}$ , rational number  
(h) -4, integer
- (a)  $40.0 \text{ cm}^2$  (b)  $8.4 \text{ cm}^2$   
(c)  $6.4 \text{ m}$
- (a)  $R = 20$ ,  $r = 10$ ,  $\pi = 3$  (1 s.f.)  
(b)  $A \approx 900$   
(c) 788

6. (i) 2.7  
(ii) 2.66

$$7) 1.1 \times 10^{-9} \text{ m} \rightarrow \text{cm} : 1.1 \times 10^{-9} \times \underset{\substack{\uparrow \\ \text{cm per m}}}{10^2} = 1.1 \times 10^{-7} \text{ cm diameter}$$

How many in 1 cm?

$$\frac{1 \text{ cm}}{1.1 \times 10^{-7} \text{ cm}} = 9,090,000 \text{ (3 sf)}$$

$9.09 \times 10^6 \text{ molecules}$

$$8) \text{ @ density} = \frac{958 \text{ kg}}{1 \text{ m}^3} = \boxed{958 \text{ kg m}^{-3}}$$

$$\text{ (b) } 1 \text{ m}^3 \times 100 \times 100 \times 100 = 10^2 \cdot 10^2 \cdot 10^2 = \boxed{10^6 \text{ cm}^3}$$

$$\text{ (c) } \frac{1 \text{ m}^3}{958 \text{ kg}} \Rightarrow \frac{10^6 \text{ cm}^3}{958 \text{ kg}} = \frac{10 \text{ cm}^3}{x \text{ kg}}$$

$x = .00958 \text{ kg}$   
 or 9.58 grams

$$10^6 x = 9580$$

$$9) \text{ @ density} = \frac{22610 \text{ kg}}{1 \text{ m}^3} = \frac{x \text{ mass}}{0.5 \text{ m}^3} \rightarrow x = \boxed{11305 \text{ kg}}$$

$$\text{ (b) } 22610 = \frac{0.1 \text{ kg}}{x \text{ m}^3}$$

$$22610 x = 0.1$$

$$x = 4.42 \times 10^{-6} \text{ m}^3$$

or

$$4.42 \times 10^{-6} \cdot 10^2 \cdot 10^2 \cdot 10^2$$

$$\boxed{4.42 \text{ cm}^3}$$

## Past Paper Questions

1) (a)  $x = 0.1265$

$$1.265 \times 10^{-1}$$

(b) 0.13

(c)  $\mathcal{E} = \left| \frac{V_A - V_E}{V_E} \right| \times 100\%$   $V_E = \text{exact}$   $V_A = \text{approx}$

$$\mathcal{E} = \left| \frac{.13 - .1265}{.1265} \right| \times 100\% = 2.77\%$$

2) (a)  $\frac{77.2 \times 3^3}{3.60 \times 2^2} = 144.75$

(b)  $1.4475 \times 10^2$

(c) (i)  $12.8 = 96 \text{ m}^2$

(ii)  $\left| \frac{96 - 90}{90} \right| \times 100\% = 6.67\%$

## Chapter 2

2) (a)  $x+2y=3 \rightarrow x=3-2y$   
 $4x+3y=2$

$$4(3-2y)+3y=2$$

$$12-8y+3y=2$$

$$12-5y=2$$

$$10=5y$$

$$\boxed{y=2}$$
  
$$\boxed{x=-1}$$

(b) use graphing calc app PLYSMLT2  $\rightarrow$  Sim. Egn Solver  
 $x = \frac{125}{101}$  (1.24 3sf)       $y = \frac{235}{101}$  (2.33 3sf)

(c)  $5x+8y=-7 \Rightarrow 5x+8y=-7$   
 $6x-y=-19$  times 8  $48x-8y=-152$

$$53x = -159$$

$$\boxed{x = -3 \quad y = 1}$$

3) (a)  $7x-2=0$        $3x-1=0$   
 $\boxed{x = 2/7 \quad x = 1/3}$

(b)  $x^2-8x-9=0$   
 $(x-9)(x+1)=0$

$$\boxed{x=9 \quad x=-1}$$

(c)  $12x^2-41x+24=0$

$$\frac{-(-41) \pm \sqrt{(-41)^2 - 4(12)(24)}}{2(12)} = \frac{41 \pm \sqrt{529}}{24} = \frac{41 \pm 23}{24}$$

$$x = \frac{41+23}{24} = \frac{64}{24} = \boxed{\frac{8}{3}}$$

$$x = \frac{41-23}{24} = \frac{18}{24} = \boxed{\frac{3}{4}}$$

$$d) \quad x^2 + 2x = 0$$

$$x(x+2) = 0$$

$$\boxed{x=0 \quad x=-2}$$

$$e) \quad 64x^2 = 144$$

$$64x^2 - 144 = 0$$

$$(8x+12)(8x-12) = 0$$

$$x = -12/8, 12/8$$

$$\boxed{x = -3/2, 3/2}$$

or  $x^2 = \frac{144}{64}$   
 $x = \pm \frac{12}{8}$   
 $x = \pm 3/2$

$$f) \quad 7.5x^2 - 6x - 9.8 = 0$$

use calc app PLYSMLT2  $\rightarrow$  Poly Root Finder

$$\boxed{x = 1.61, -0.811 \quad (3 \text{ sf})}$$

$$4) \quad \begin{array}{l} 4b + 3p = 5529 \\ 2b + 5p = 6751 \end{array} \Rightarrow \begin{array}{l} 4b + 3p = 5529 \\ -4b - 10p = -13502 \\ \hline -7p = -7973 \end{array}$$

(b)

$$p = 1139$$

$$b = 528$$

$$\boxed{\text{bracelet} = 528 \text{ INR} \quad \text{Pendant} = 1139 \text{ INR}}$$

$$g) \quad C = a + bn \quad n = \# \text{ of units} \quad b = \text{unit charge} \quad a = \text{fixed charge}$$

$$a) \quad \begin{array}{l} 106.24 = a + b(820) \\ 85.84 = a + b(650) \end{array}$$

(b) use graphing calc

$$\boxed{a = 7.84 \quad b = 0.12}$$

$$c) \quad C = 7.84 + 0.12n \quad n = 745$$

$$\boxed{C = \text{f} 97.24}$$

7) width =  $w$       length =  $w + 18$

$$w(w + 18) = 760$$

$$w^2 + 18w - 760 = 0$$

$$(w - 20)(w - 38) = 0$$

$$w = 20 \quad w = 38$$

$$20 \text{ m} \times 38 \text{ m}$$

8)  $h = 11t - 2.3t^2$        $t = \text{seconds}$        $h = \text{height}$

(a)  $10 = 11t - 2.3t^2$

$$2.3t^2 - 11t + 10 = 0$$

use graphing calc

$$t = 1.22 \text{ s or } 3.56 \text{ s}$$

(b)  $0 = 11t - 2.3t^2$

$$0 = t(11 - 2.3t)$$

$$t = 0 \quad 11 - 2.3t = 0$$

↑

$$11 = 2.3t$$

$$t = 4.78 \text{ s}$$

this is  
when it  
started

↑  
this is when it  
returns

## Additional Review Questions

1)  $3.2 \times 10^{-4} \text{ m} \rightarrow \text{cm}$       $1 \text{ m} = 10^2 \text{ cm}$

$$3.2 \times 10^{-4} \cdot 10^2$$

$$3.2 \times 10^{-2} \text{ cm}$$

$$\frac{10 \text{ cm}}{(3.2 \times 10^{-2}) \text{ cm}} = 312.5$$

313 sheets

2) (a) C  $\rightarrow 2.63 \times 10^{-5} = .0000263$  ← bigger C  
D  $\rightarrow 8 \times 10^{-7} = .0000008$

(ii) D times? = C  $\Rightarrow \frac{C}{D} = \frac{(2.63 \times 10^{-5})}{(8 \times 10^{-7})} = 32.875$

32.9 times

3)  $4 \times 10^5 \text{ km h}^{-1}$

$$30 \text{ days} = 30 \text{ days} \cdot 24 \text{ hrs} = 720 \text{ hrs}$$

$$4 \times 10^5 \cdot 720 = 288,000,000$$

$$= 2.88 \times 10^8 \text{ km}$$

4) (a) @ 299 792 458  $\rightarrow 300\,000\,000 \text{ ms}^{-1}$

(b)  $\frac{300\,000\,000 \text{ m}}{1000 \text{ m}} = 300\,000 \text{ km}$

(c)  $1 \text{ hr} = 60 \text{ min} = 3600 \text{ sec} \Rightarrow 300\,000 \cdot 3600 = 1,080,000,000$   
 $1.08 \times 10^9 \text{ km h}^{-1}$

$$5) \text{ (a) } \frac{52\,200 \text{ g}}{90 \text{ books}} = 580 \text{ grams} \div 1000 = \boxed{.580 \text{ kg}}$$

$$\text{(b) } .580 \rightarrow \boxed{.6} \text{ 1 sig fig}$$

$$6) \text{ (a) } x^2 = \text{Area}$$

$$\text{(b) } 2.56 \text{ km}^2 \rightarrow \text{m}^2$$

$$2.56 \times 1000 \times 1000 = 2,560,000$$

$$\text{(c) } x^2 = 2,560,000$$

$$x = \sqrt{2,560,000}$$

$$\boxed{x = 1600 \text{ meters}}$$

$$\text{(ii) } 1600 \times 4 = \boxed{4400 \text{ meters}}$$

$$7) \text{ (a) } 1 \text{ CAD} = 29.7044 \text{ RUB}$$

$$29.7044 (800) = \boxed{23763.52 \text{ RUB}}$$

$$\text{(b) } 7000 \text{ rubles}$$

$$1 \text{ RUB} = \frac{1}{29.7044 \text{ CAD}} \Rightarrow 7000 \left( \frac{1}{29.7044} \right) = \boxed{235.66 \text{ CAD}}$$



8) (a) Buy your "foreign" money

$$\$800 \cdot .766 = \boxed{\text{€ } 612.80}$$

(b) Sell your "local" money back

$$\frac{612.8}{.785} = \boxed{\$780.64}$$

(c)  $\$800 - \$780.64 = \$19.36$

$$\frac{19.36}{800} = .0242$$

2.42%

9) (a)  $1600 (23.910) = 38256 \times 98\% = \boxed{37490.88 \text{ THB}}$

(b)  $85 \text{ THB} \cdot \left(\frac{1}{23.910}\right) = \boxed{3.55 \text{ SGD}}$

10) (a)  $p = \text{Euro} \rightarrow \text{Dollar}$

Dollar  $\rightarrow$  Euro  $\$1 = .759 \text{ €}$

$$p = \frac{1}{.759} = \boxed{1.32}$$

$q = \text{Euro} \rightarrow \text{JPY}$

JPY  $\rightarrow$  Euro  $¥1 = .00926$

$$q = \frac{1}{.00926} = \boxed{107.99}$$

(b)  $\text{Euros} \cdot (.852) = 150 \Rightarrow \frac{150}{.852} = \boxed{176.06 \text{ €}}$