

# SHARP

## Worksheet 28 Memorandum: Revision Term 3

### Grade 9 Mathematics

1. a) i) the input value squared.  
ii)  $y = x^2$   
iii)

<b>x</b>	1	2	3	4	7	10	15
<b>y</b>	1	4	9	16	49	100	225

- b) i) starting at -5 add 4 to each previous term to get the next output value.  
ii)  $n = 4m - 5$   
iii)

<b>m</b>	0	1	2	7	9	14	23
<b>n</b>	-5	-1	3	23	31	51	87

- c) i) multiply the previous term by  $\frac{2}{3}$  or divide the previous term by  $\frac{3}{2}$   
ii)  $s = 54 \left(\frac{2}{3}\right)^{t-1}$   
iii)

<b>s</b>	1	2	3	4	6	9	12
<b>t</b>	54	36	24	16	$7\frac{1}{9}$	$2\frac{26}{243}$	$\frac{4096}{6561}$

2. Simplify the following expressions:

a)  $(x^2 + 3x + 5)(4x) - 7x(8x - 7)$   
 $= 4x^3 + 12x^2 + 20x - 56x^2 + 49x$   
 $= 4x^3 - 44x^2 + 69x$

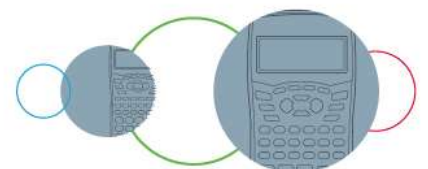
b)  $\frac{9x^4 + 21x^2 + 6}{3x^2}$   
 $= \frac{9x^4}{3x^2} + \frac{21x^2}{3x^2} + \frac{6}{3x^2}$   
 $= 3x^2 + 7 + \frac{2}{x^2}$

c)  $(x + 5)^2$   
 $= (x + 5)(x + 5)$   
 $= x^2 + 10x + 25$

d)  $(4x + 3)(3x - 4) - 5x(7x + 8)$   
 $= 12x^2 - 16x + 9x - 12 - 35x^2 - 40x$   
 $= -23x^2 - 47x - 12$

e)  $(7x)^2 + \sqrt{25x^4} - \sqrt[3]{64x^9}$   
 $= 49x^2 + 5x^2 - 4x^3$   
 $= -4x^3 + 54x^2$

f)  $(2x - 3)(2x + 3)$   
 $= 4x^2 + 6x - 6x - 9$   
 $= 4x^2 - 9$



$$\begin{aligned} \text{g)} \quad & \frac{72xy^3 - 48x^2y^2 + 60x^3y}{12xy} \\ &= \frac{72xy^3}{12xy} - \frac{48x^2y^2}{12xy} + \frac{60x^3y}{12xy} \\ &= 6y^2 - 4xy + 5x^2 \end{aligned}$$

$$\begin{aligned} \text{i)} \quad & (7x - 8)^2 \\ &= (7x - 8)(7x - 8) \\ &= 49x^2 - 56x - 56x + 64 \\ &= 49x^2 - 112x + 64 \end{aligned}$$

$$\begin{aligned} 3. \quad \text{a)} \quad & 12x^2 + 15x \\ &= 3x(4x + 5) \end{aligned}$$

$$\begin{aligned} \text{c)} \quad & x^2 + 10x + 24 \\ &= (x + 4)(x + 6) \end{aligned}$$

$$\begin{aligned} \text{e)} \quad & x^2 + 8x + 15 \\ &= (x + 3)(x + 5) \end{aligned}$$

$$\begin{aligned} \text{g)} \quad & 81x^5y^3 - 64x^3y^5 \\ &= x^3y^3(81x^2 - 64y^2) \\ &= x^3y^3(9x - 8y)(9x + 8y) \end{aligned}$$

$$\begin{aligned} \text{i)} \quad & 72a^5b^5 - 98b \\ &= 2a^3b(36a^2b^4 - 49) \\ &= 2a^3b(6ab^2 - 7)(6ab^2 + 7) \end{aligned}$$

$$\begin{aligned} 4. \quad \text{a)} \quad & 4ab - 5c + 7d^2 \\ &= 4(8)(7) - 5(-3) + 7(-1)^2 \\ &= 224 + 15 + 7 \\ &= 246 \end{aligned}$$

$$\begin{aligned} \text{c)} \quad & \frac{4a^2bc}{d} \\ &= \frac{4(-1)^2(7)(-7)}{-3} \\ &= \frac{-196}{-3} \\ &= 65\frac{1}{3} \end{aligned}$$

$$\begin{aligned} \text{h)} \quad & 3x(4x^2 - 7x + 12) - (2x - 1)(3x + 7) \\ &= 12x^3 - 21x^2 + 36x - (6x^2 + 14x - 3x - 7) \\ &= 12x^3 - 21x^2 + 36x - 6x^2 - 14x + 3x + 7 \\ &= 12x^3 - 27x^2 + 25x + 7 \end{aligned}$$

$$\begin{aligned} \text{j)} \quad & (9x + 1)^2 - 3x(4x + 3) \\ &= (9x + 1)(9x + 1) - 12x^2 - 9x \\ &= 81x^2 + 9x + 9x + 1 - 12x^2 - 9x \\ &= 69x^2 + 9x + 1 \end{aligned}$$

$$\begin{aligned} \text{b)} \quad & 9x^2 - 25y^2 \\ &= (3x - 5y)(3x + 5y) \end{aligned}$$

$$\begin{aligned} \text{d)} \quad & 45x^2y - 15xy^2 - 5xy \\ &= 5xy(9x - 3y - 1) \end{aligned}$$

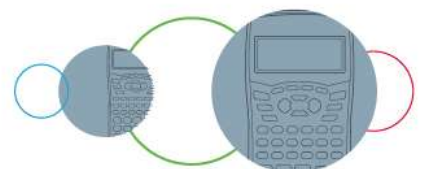
$$\begin{aligned} \text{f)} \quad & x^2 + 11x + 18 \\ &= (x + 2)(x + 9) \end{aligned}$$

$$\begin{aligned} \text{h)} \quad & 3x^2 + 33x + 90 \\ &= 3(x^2 + 11x + 30) \\ &= 3(x + 5)(x + 6) \end{aligned}$$

$$\begin{aligned} \text{j)} \quad & -5x^3 - 110x^2 - 600x \\ &= -5x(x^2 + 22x + 120) \\ &= -5x(x + 12)(x + 10) \end{aligned}$$

$$\begin{aligned} \text{b)} \quad & 3dc^2 + 5b - 7a \\ &= 3(-5)(4)^2 + 5(-6) - 7(0) \\ &= -240 - 30 \\ &= -270 \end{aligned}$$

$$\begin{aligned} \text{d)} \quad & 4(5ac - 5b) + 2d^2 \\ &= 4[5(-3)(-9) - 5(-1)] + 2(-2)^2 \\ &= 4(140) + 8 \\ &= 568 \end{aligned}$$



$$\begin{aligned}
 \text{e)} \quad & \sqrt{4a^2 + 5b} \quad a = -1 \text{ and } b = 1 \\
 & = \sqrt{4(-1)^2 + 5(1)} \\
 & = \sqrt{9} \\
 & = 3
 \end{aligned}$$

5. Given the expression:  $4x^5 + 6x^2 - 7x - 9$

a) 4 terms b) 5<sup>th</sup> degree

c) -7 d) -9

$$\begin{aligned}
 \text{e)} \quad & 4x^5 + 6x^2 - 7x - 9 \text{ for } x = -1 \\
 & = 4(-1)^5 + 6(-1)^2 - 7(-1) - 9 \\
 & = -4 + 6 + 7 - 9 \\
 & = 0
 \end{aligned}$$

6. a)  $3x + 7 = 5$   
 $3x = -2$   
 $x = -\frac{2}{3}$

b)  $x^2 + 21x + 108 = 0$   
 $(x + 9)(x + 12) = 0$   
 $x = -9 \text{ or } x = -12$

c)  $ax + b = c$   
 $ax = c - b$   
 $x = \frac{c-b}{a}$

d)  $x^2 - 16 = 0$   
 $(x - 4)(x + 4) = 0$   
 $x = 4 \text{ or } x = -4$

e)  $3^x + 1 = 10$   
 $3^x = 9$   
 $3^x = 3^2$   
 $x = 2$

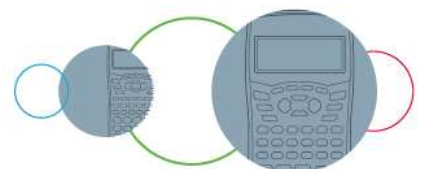
f)  $x^4 + 5 = 21$   
 $x^4 = 16$       OR       $x^4 - 16 = 0$   
 $x = \sqrt[4]{16}$        $(x^2 - 4)(x^2 + 4) = 0$   
 $x = 2$        $(x - 2)(x + 2)(x^2 + 4) = 0$   
 $x = -2 \text{ or } x = 2$

g)  $-2x^2 - 16x - 14 = 0$   
 $-2(x^2 + 8x + 7) = 0$   
 $-2(x + 1)(x + 7) = 0$   
 $x = -1 \text{ or } x = -7$

h)  $3x^2 - 27 = 0$   
 $3(x^2 - 9) = 0$   
 $3(x + 3)(x - 3) = 0$   
 $x = -3 \text{ or } x = 3$

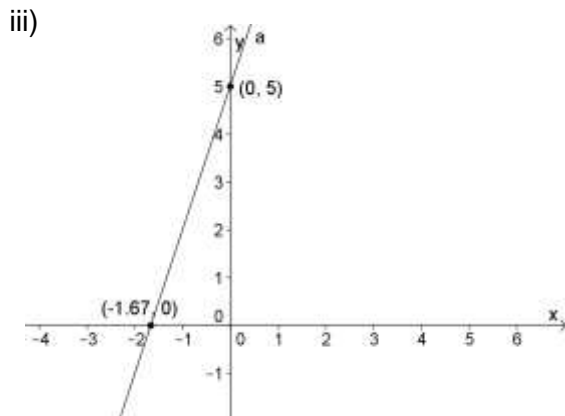
i)  $\frac{3x}{4} - 1 = 5$   
 $\frac{3x}{4} = 6$   
 $3x = 24$   
 $x = 8$

j)  $x^2 + 10 = -7x$   
 $x^2 + 7x + 10 = 0$   
 $(x + 2)(x + 5) = 0$   
 $x = -2 \text{ or } x = -5$

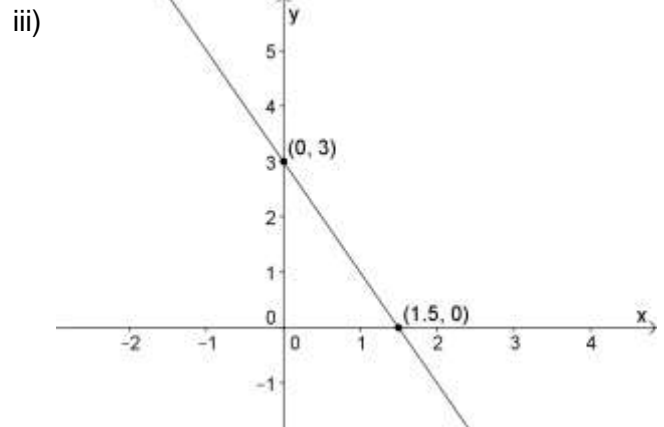


7. a) i) linear  
ii) decreasing
- b) i) non-linear  
ii) increasing
- c) i) linear  
ii) constant
- d) i) linear  
ii) increasing
- e) i) non-linear  
ii) decreasing
- f) i) non-linear  
ii) decreasing

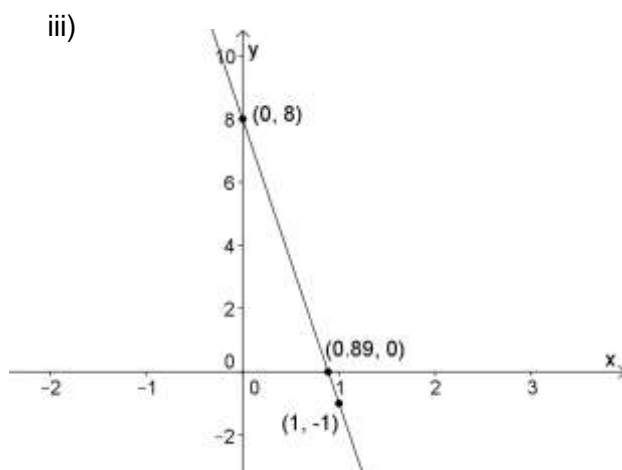
8. a)  $y = 3x + 5$   
i)  $m = 3$  and  $y$ -intercept = 5  
ii)  $0 = 3x + 5$   
 $3x = -5$   
 $x = -\frac{5}{3} = -1\frac{2}{3}$



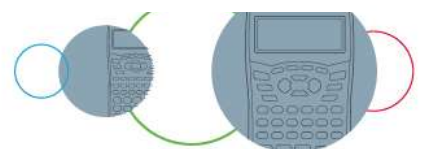
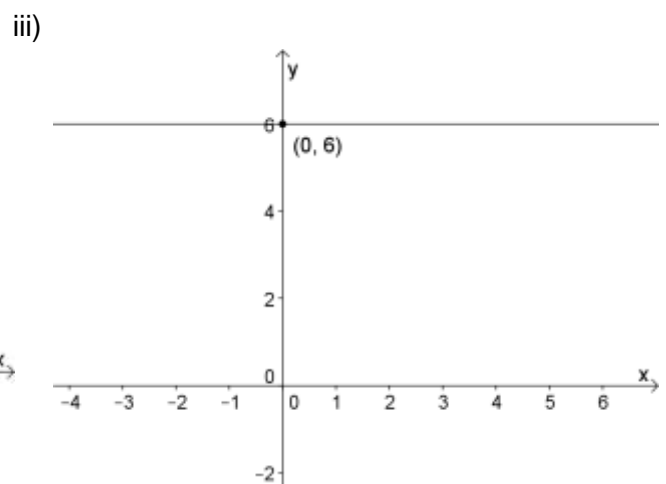
- b)  $y = -2x + 3$   
i)  $m = -2$  and  $y$ -intercept = 3  
ii)  $0 = -2x + 3$   
 $2x = 3$   
 $x = \frac{3}{2} = 1\frac{1}{2}$



- c)  $y = -9x + 8$   
i)  $m = -9$  and  $y$ -intercept = 8  
ii)  $0 = -9x + 8$   
 $9x = 8$   
 $x = \frac{8}{9}$



- d)  $y = 6$   
i)  $m = 0$  and  $y$ -intercept = 6  
ii) no  $x$ -intercept



e)  $3y + x = 6$

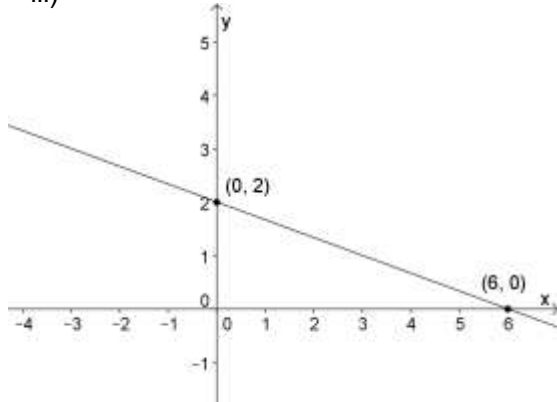
i)  $3y = -x + 6$

$$y = -\frac{1}{3}x + 2$$

$m = -\frac{1}{3}$  and y-intercept = 2

ii)  $x = 6$

iii)



f)  $x = 2y + 7$

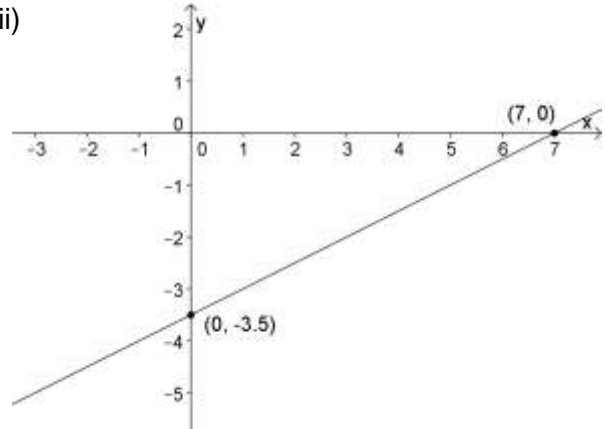
i)  $2y = x - 7$

$$y = \frac{1}{2}x - 3\frac{1}{2}$$

$m = \frac{1}{2}$  and y-intercept =  $-3\frac{1}{2}$

ii)  $x = 7$

iii)



g)  $y = 8x + 6$

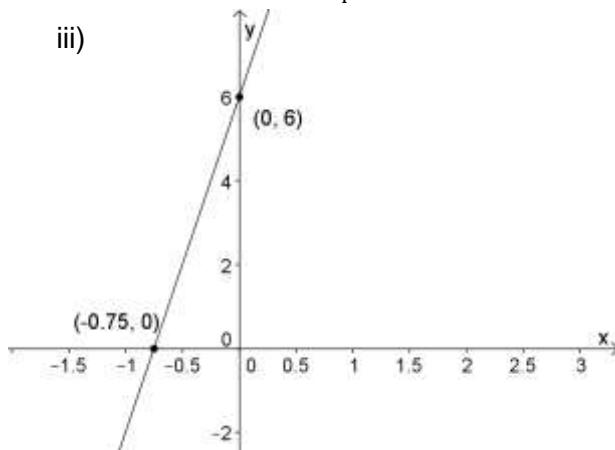
i)  $m = 8$  and y-intercept = 6

ii)  $0 = 8x + 6$

$$8x = -6$$

$$x = -\frac{3}{4}$$

iii)



h)  $5y - 2x = 10$

i)  $5y = 2x + 10$

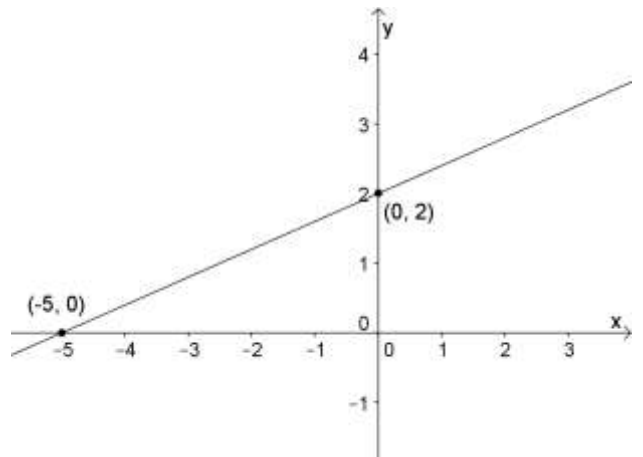
$$y = \frac{2}{5}x + 2$$

$m = \frac{2}{5}$  and y-intercept = 2

ii)  $-2x = 10$

$$x = -5$$

iii)



i)  $3x = 2y$

i)  $y = \frac{3}{2}x$

$m = \frac{3}{2}$  and y-intercept = 0

ii)  $x = 0$

j)  $-3y = 6x + 9$

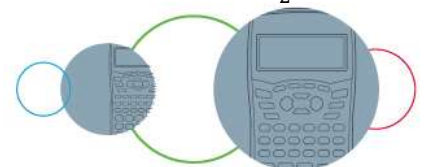
i)  $y = -2x - 3$

$m = -2$  and y-intercept = -3

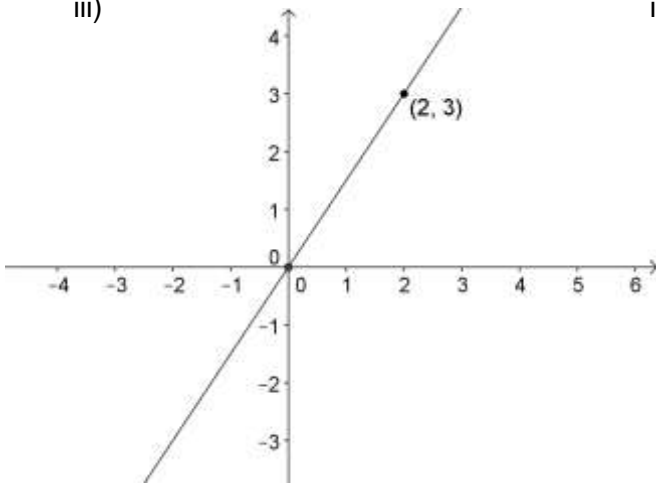
ii)  $0 = 6x + 9$

$$6x = -9$$

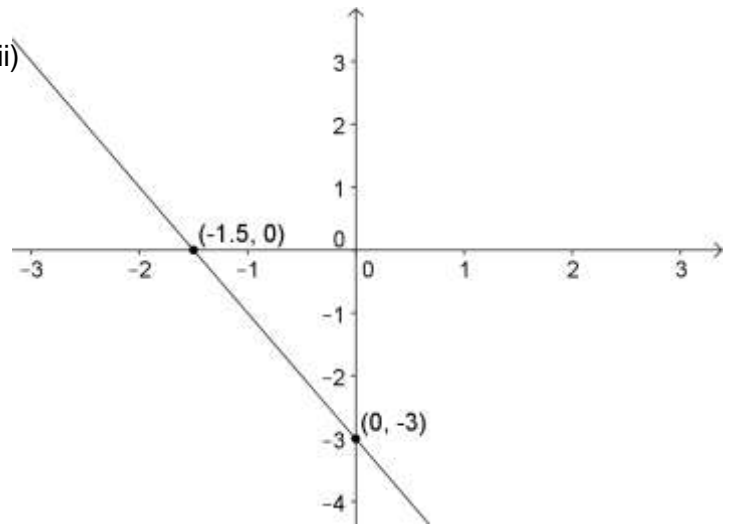
$$x = 1\frac{1}{2}$$



iii)



iii)



9. Find the equations for the following graphs:

a)  $y = mx + 5$   $(-1, 3)$   
 $3 = m(-1) + 5$   
 $-2 = -m$   
 $m = 2$   
 $y = 2x + 5$

b)  $y = mx - 3$   $(6, 0)$   
 $0 = 6m - 3$   
 $3 = 6m$   
 $m = \frac{1}{2}$   
 $y = \frac{1}{2}x - 3$

c)  $x = -1$

d)  $y = mx + 1$   $(2, -3)$   
 $-3 = 2m + 1$

f)  $y = mx + c$   $(2, 5)$  and  $(4, 1)$   
 $5 = 2m + c$   
 $5 - 2m = c \dots 1$   
 $1 = 4m + c \dots 2$   
 $1 = 4m + 5 - 2m$   
 $-4 = 2m$   
 $m = -2$   
 $c = 5 - 2(-2)$   
 $c = 9$   
 $y = -2x + 9$

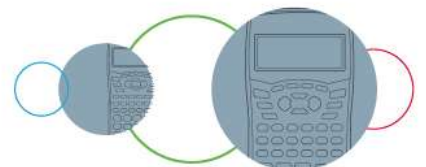
$-4 = 2m$   
 $m = -2$   
 $y = -2x + 1$

e)  $y = mx - 4$   $(4, 0)$   
 $0 = 4m - 4$   
 $4 = 4m$   
 $m = 1$   
 $y = x - 4$

10. Find the surface area and volume for each of these 3D objects.

a)  $SA = 2\pi r^2 + 2\pi rh$   
 $SA = 2\pi (5)^2 + 2\pi(5)(15)$   
 $SA = 628.32 \text{ cm}^2$

b)  $SA = 6l^2$   
 $SA = 6(28)^2$   
 $SA = 4704 \text{ mm}^2$



$$\text{Volume} = \pi r^2 h$$

$$\text{Volume} = \pi(5)^2(15)$$

$$\text{Volume} = 1\,178,1\text{ cm}^3$$

$$\text{Volume} = l^3$$

$$\text{Volume} = (28)^3$$

$$\text{Volume} = 21\,952\text{ mm}^3$$

c)  $SA = 2lb + 2lh + 2hb$

$$SA = 2(8)(3.5) + 2(8)(12) + 2(3.5)(12)$$

$$SA = 56 + 192 + 84$$

$$SA = 332\text{ m}^2$$

d)  $SA = 2\left(\frac{1}{2} \times b \times h\right) + r(s_1 + s_2 + s_3)$

$$r^2 = 52^2 + 56^2$$

$$r^2 = 5\,840$$

$$r = 76.42\text{ mm}$$

$$SA = 2\left(\frac{1}{2} \times 56 \times 52\right) + 76.42(56 + 52 + 42)$$

$$SA = 14\,375\text{ mm}^2$$

$$\text{Volume} = lbh$$

$$\text{Volume} = 8 \times 12 \times 3.5$$

$$\text{Volume} = 336\text{ m}^3$$

$$\text{Volume} = \frac{1}{2} \times b \times h \times l$$

$$\text{Volume} = \frac{1}{2} \times 56 \times 52 \times 42$$

$$\text{Volume} = 61\,152\text{ mm}^3$$

e)  $SA = 6l^2$

$$SA = 6(82)^2$$

$$SA = 40\,344\text{ cm}^2$$

f)  $SA = 2lb + 2lh + 2hb$

$$SA = 2(50)(44) + 2(50)(45) + 2(44)(45)$$

$$SA = 12\,860\text{ mm}^2$$

$$\text{Volume} = l^3$$

$$\text{Volume} = (82)^3$$

$$\text{Volume} = 551\,368\text{ cm}^3$$

$$\text{Volume} = lbh$$

$$\text{Volume} = (50)(44)(45)$$

$$\text{Volume} = 99\,000\text{ mm}^3$$

g)  $SA = 2\pi r^2 + 2\pi rh$

$$SA = 2\pi(10)^2 + 2\pi(10)(60)$$

$$SA = 4\,398.23\text{ m}^2$$

h)  $SA = 2\left(\frac{1}{2} \times b \times h\right) + r(s_1 + s_2 + s_3)$

$$r^2 = 90^2 + 50^2$$

$$r^2 = 10\,600$$

$$r = 102.96$$

$$SA = 2\left(\frac{1}{2} \times 50 \times 90\right) + 102.96(50 + 90 + 30)$$

$$SA = 22\,000.2\text{ cm}^2$$

$$\text{Volume} = \pi r^2 h$$

$$\text{Volume} = \pi(10)^2(60)$$

$$\text{Volume} = 18\,849.56\text{ m}^3$$

$$\text{Volume} = \frac{1}{2} \times b \times h \times l$$

$$\text{Volume} = \frac{1}{2} \times 50 \times 90 \times 30$$

$$\text{Volume} = 67\,500\text{ cm}^3$$

