

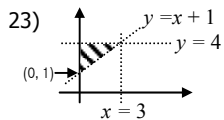
# ANSWERS – DIAGNOSTIC TEST for Higher Students – Number and Algebra

## TEST 1 of 3

- 1) i) 4      ii) 120
- 2) i) 23      ii)  $2 \times 2 \times 3 \times 5$
- 3) i) 6      ii) -5      iii) 1.5
- 4) i)  $y = 4(-3) - 21 = -33$   
ii)  $y = -(-3)^2 = -9$
- 5) i)  $5^{8+3} = 5^{11}$       ii)  $a^{6 \times 5 - 6} = a^{24}$
- 6) i) 13.1      ii) 13.15
- 7) i)  $1.2 \times 10^3$  (also correct but with unnecessary noughts is  $1.200 \times 10^3$ )  
ii)  $9.998999 \times 10^{10}$
- 8) i) 2:3      ii) £8.80 : £13.20
- 9) i)  $\frac{11}{12}$       ii)  $\frac{20}{21}$
- 10)  $a = \frac{1}{3}, b = -3, c = \frac{1}{16}$
- 11)  $\frac{31}{90}$
- 12) i) 26      ii) a) £347.29 (to the nearest penny) b) £2112
- 13) £15,000
- 14) i) 12      ii) 0.7      iii) 12
- 15)  $m = 0.960854...$  or accept 0.96 (2 s.f.) or better

## TEST 2 of 3

- 16) i)  $3x + 6$       ii)  $x^2 + 5x + 6$
- 17) i)  $3(2a + 3)$   
ii)  $(x + 1)(x - 2)$
- 18) i) a)  $3\sqrt{2}$       b) 27  
c)  $\pi 10^2 = 100\pi \text{ cm}^2$   
ii)  $\frac{1}{\sqrt{7}} \times \frac{\sqrt{7}}{\sqrt{7}} = \frac{\sqrt{7}}{7}$
- 19)  $2(x + 5) = 3x$
- 20) i)  $x = 5.5$       ii)  $x = 5$       iii)  $x = 0.25$
- 21) i)  $y = \frac{x-1}{2}$       ii)  $y = \sqrt[3]{\frac{x}{2}}$       iii)  $y = \frac{2x}{x-1}$
- 22) a) i)  $x \leq 7.5$       ii)  $x < -5$   
b) -1, 0, 1, 2.



- 24) a) 51, 66  
b) 625, 3125
- 25)  $x = 3.59$  (full exam marks usually requires trying  $x = 3.595$  – did you?)
- 26)  $x = 6$  or  $x = -7$
- 27) i)  $(x - 4)^2 - 4^2 - 5 = 0$   
leading to  $x = 4 + \sqrt{21}$  or  $4 - \sqrt{21}$   
ii)  $x = 2$  or  $x = 4$

## TEST 3 of 3

- 28)  $x = 4, y = -2$
- 29)  $x = 1, y = 1$
- 30)  $3n + 1$
- 31) a) gradient = 4      y-intercept = -5  
b)  $y = 3x + 5$
- 32) i) A and B are parallel  
ii) C and D are perpendicular
- 33) i) a) B → C      b) C → D      c) speed (or velocity)  
ii) a) constant acceleration (between A and B)  
b) total distance travelled (between A & D)  
c) constant speed.
- 34)

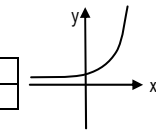
$x$	-2	-1	0	1	2
$x^2$	-8	-1	0	1	8
$-x^2$	-4	-1	0	-1	-4
$y = x^3 - x^2$	-12	-2	0	0	4

- 35) i)  $-\frac{1}{3}$       ii) A

36)

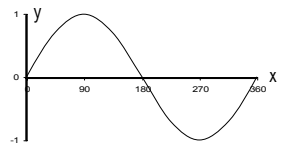
i) 

$x$	-5	0	5
$y = 3^x$	0.0041...	1	243



ii) 

$x$	$0^\circ$	$45^\circ$	$90^\circ$
$y = \sin x$	0	0.707...	1



iii) see graphs

- 37) i) (2, 6)      ii) (1, 3)

# ANSWERS – DIAGNOSTIC TEST for Higher Students – Shape and Space

## TEST 1 of 2

- 1)  $x = 18\text{cm}$
- 2)  $\theta = 38.682...^\circ = 38.7^\circ$  (3 s.f.)  
 $a = 15.760... \text{cm} = 15.8\text{cm}$  (3 s.f.)
- 3) a) Length BE =  $5.0990... \text{cm} = 5.10\text{cm}$  (3 s.f.) (or  $\sqrt{26}$ )  
b)  $\angle ABH = 53.130...^\circ = 53.1^\circ$  (3 s.f.)
- 4)  $A = 38.213...^\circ = 38.2^\circ$  (3 s.f.)  
 $B = 56.469...^\circ = 59.5^\circ$  (3 s.f.)
- 5) Area of triangle =  $17.369... \text{cm}^2 = 17.4\text{cm}^2$  (3 s.f.)
- 6)  $075^\circ$
- 7) Surface area of cuboid =  $52\text{cm}^2$   
Surface area of cylinder =  $2 \times \pi \times 2^2 + 2 \times \pi \times 2 \times 8$   
=  $40\pi \text{ cm}^2$  or  $125.66... \text{cm}^2$   
=  $126\text{cm}^2$  (3sf)  
(=  $125.6$  using  $\pi = 3.14$ )
- 8) a) Volume of cuboid =  $24\text{cm}^3$   
Volume of cylinder =  $2^2 \times \pi \times 8 = 32\pi \text{ cm}^3$   
or  $100.53... = 101 \text{ cm}^3$  (3sf)  
( $100.48 \text{ cm}^3$  using  $\pi = 3.14$ )  
b) Volume of pyramid =  $\frac{1}{3} \times 6^2 \times 5 = 60\text{cm}^3$
- 9) a) They are perpendicular or meet at right-angles  
b) i)  $75^\circ$       ii)  $105^\circ$   
c)  $\angle TAB = \angle ACB$
- 10) a) e.g.
- b) Perimeter =  $17.535... = 17.5\text{cm}$  3sf  
Area =  $6.1435... \text{cm}^2$  or  $6.14\text{cm}^2$  3sf

## TEST 2 of 2

- 11) a) SSS stands for Side, Side, Side.  
b) A and C are congruent because SAS.
- 12) See construction in SS12
- 13) See perpendicular bisection in SS13.  
Diagram shows shading.
- 14) i) Reflection in the line  $x = 0.5$   
ii) Rotation  $90^\circ$  clockwise about (1, -3)
- 15) i) Scale factor 2, centre of enlargement (0, 2).  
ii) Scale factor  $\frac{1}{2}$ , centre of enlargement (0, 2).  
iii) Scale factor -2, centre of enlargement (0, 2).  
iv) Scale factor  $-\frac{1}{2}$ , centre of enlargement (0, 2).
- 16) Length AE =  $\frac{5}{3} \times 4 = 6\frac{2}{3} = 6.67$  (3 s.f.)
- 17)  $x = 30 \times \left(\frac{6}{3}\right)^3 = 240\text{cm}^3$ .
- 18) i) Length ii) Area
- 19) a)  $a =$  distance;  $b =$  time;  $c =$  mass;  $d =$  volume  
b) Density =  $32 \div 6 = 5\frac{1}{3}$  or  $5.33 \text{ kg/cm}^3$  (3 s.f.)
- 20)  $500,000 \text{ cm}^3 = 500000 \div (100)^3 = 0.5\text{m}^3$
- 21) i) a) They are parallel.      b)  $\begin{pmatrix} -3 \\ 4 \end{pmatrix}$   
ii)  $\mathbf{d} = \mathbf{a} + \mathbf{b} - \mathbf{c}$