

## DIAGNOSTIC Number and Algebra TEST 1 of 3

- 1) Calculate the i) Highest Common Factor of 20 and 24  
ii) Lowest Common Multiple of 20 and 24.
- 2) i) What is the first prime number above 20?  
ii) Write 60 as a product of primes.
- 3) Calculate: i)  $-3 \times -2$                       ii)  $-3 - 2$                       iii)  $-3 \div -2$
- 4) Find  $y$  when  $x = -3$  where i)  $y = 4x - 21$                       ii)  $y = -x^2$
- 5) Calculate: i)  $5^8 \times 5^3$                       *Write your answer in index form.*  
ii)  $((a^6)^5) \div a^6$                       *Write your answer in index form.*
- 6) Round 13.145 to i) 3 s.f.                      ii) 4 s.f.
- 7) i) Write 1200 in Standard Form.  
ii) Use your calculator to calculate  $9\,999 \times 9\,999\,999$  and using the full calculator display write down your answer in Standard Form.
- 8) i) Simplify  $30 : 45$                       ii) Divide £22 in the ratio 2 : 3
- 9) Calculate i)  $\frac{2}{3} + \frac{1}{4}$                       ii)  $\frac{5}{7} \div \frac{3}{4}$
- 10) Find  $a, b, c$  where: i)  $\sqrt[3]{2} = 2^a$                       ii)  $\frac{1}{2^3} = 2^b$                       iii)  $64^{-\frac{2}{3}} = c$ .
- 11) Write  $0.\dot{3}4$  as a simplified fraction.
- 12) i) Calculate 13% of 200.  
ii) £300 is invested at 5% compound interest for 3 years. No interest is removed.  
a) Calculate the value of the investment after 3 years, to the nearest penny.  
b) Calculate the value of the investment after 40 years, to the nearest pound.
- 13) A car costs £17,625 including VAT at 17.5%. Calculate the price of the car before VAT.
- 14) i)  $F$  is in direct proportion to  $x$ .  $F = 3$  when  $x = 8$ . Find  $F$  when  $x = 32$   
ii)  $G$  is inversely proportion to  $y$ .  $G = 7$  when  $y = 9$ . Find  $G$  when  $y = 90$   
iii)  $H$  is proportional to the square of  $z$ .  $H = 2$  when  $z = 3$ . Find  $z$  when  $H = 32$ .
- 15) Calculate the upper bound of  $m$ , where  $m = \frac{x}{y}$ ,  $x = 13$  to 2 significant figures,  
and  $y = 14.1$  to 3 significant figures

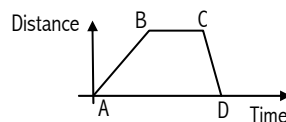
Now mark your work and then mark your grid to see which sections you need to revise. For each question you got COMPLETELY correct mark a ✓ in that section. For example if you got both parts of Q1 correct then put a ✓ in section NA1, else but a ✗. Revise each of your ✗ sections by working through the revision material provided.



## DIAGNOSTIC Number and Algebra TEST 3 of 3

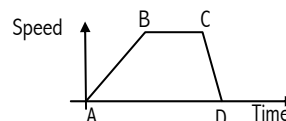
- 28) Solve the simultaneous equations:  $4x + 7y = 2$   
 $3x - y = 14$
- 29) Solve the simultaneous equations:  $y = x^2$  and  $2y - 4x = -2$
- 30) Find the  $n^{\text{th}}$  term of the sequence  $4, 7, 10, 13, \dots$
- 31) a) What is the gradient and  $y$ -intercept of the equation  $y = 4x - 5$ ?  
 b) Find the equation of the straight line which passes through the points  $(0, 5)$  and  $(1, 8)$ .
- 32) A)  $y = 2 - 4x$    B)  $2y = -8x$    C)  $y = 4x + 2$    D)  $y = -\frac{1}{4}x - \frac{1}{2}$ .  
 Which of these lines are: i) parallel ii) perpendicular?

- 33) Vishal's journey is represented by this graph →



- i) a) When is Vishal stationary (stopped)?  
 b) When is he moving fastest?  
 c) What does the gradient of the graph represent?

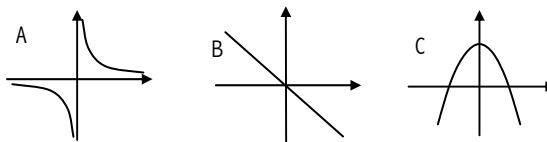
- ii) a) What does the gradient AB represent in this graph? →  
 b) What does the area ABCD represent in this graph?  
 c) What is happening between B and C in this graph?



- 34) Copy and complete the table of values for  $y = x^3 - x^2$   
 Use the optional rows in the table if this helps.

$x$	-2	-1	0	1	2
$y = x^3 - x^2$					

- 35) i) What is the reciprocal of  $-3$ ?  
 ii) Which graph represents  $y = \frac{1}{x}$  :



- 36) Complete the table of values:

i) 

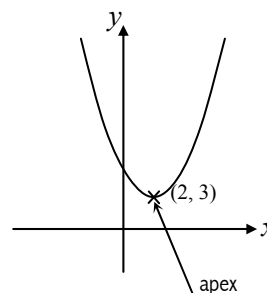
$x$	-5	0	5
$y = 3^x$			

ii) 

$x$	$0^\circ$	$45^\circ$	$90^\circ$
$y = \sin x$			

- iii) Sketch the graphs of  $y = \sin x$ , for  $0 \leq x < 360^\circ$ , and  $y = 3^x$ .

- 37) This is the graph of  $f(x) = (x - 2)^2 + 3$



Give the coordinates of the apex after a transformation of:

- i)  $y = 2f(x)$ ?  
 ii)  $y = f(2x)$ ?

Now mark your work and then mark your grid to see which sections you need to revise. For each question you got COMPLETELY correct mark a ✓ in that section. For example if you got both parts of Q33 correct then put a ✓ in section NA33, else but a ✗. Revise each of your ✗ sections by working through the revision material provided.