

# NUMERICAL REASONING

## TEST 2

### Worked Solutions

**Question 1: D**

The missing number in the series is 7654

**Question 2: C**

The most logical answer following from the pattern of numbers in the grid is 35

**Question 3: B**

Carton 1:  $6 \times 600 = 3,600$  g (3.6 kg)

Carton 2:  $12 \times 200 = 2,400$  g (2.4 kg)

$$\frac{3,600 + 2,400}{2} = 3,000$$

Note the answer is not 3,000

Carton 1:  $3,600 - 600 = 3,000$

Carton 2:  $2,400 + 600 = 3,000$

1 canned drink, which weighs 600 grams must be taken from the first carton and added to the other, so both carry equal load i.e. 3 kg (3,000 grams)

**Question 4: C**

Refer to the completed grid below. The pattern can be found by

R	S	T	U	V	W
Q	12	12	12	12	12
P	12	P	Q	R	S
O	12	O	10	10	10
N	12	N	10	N	O
M	12	M	10	M	8

### Question 5: C

**Let:**

x represent Bella's age now.

y represent Ella's age now,

z represent Eva's age now.

$$x - y = y - z$$

(From the first sentence)

$$x - 6 = 2((x + 16) - (y + 16))$$

(From the second sentence)

$$x - 6 = 2(x + 16 - y - 16)$$

$$x - 6 = 2(x - y)$$

We now have 2 equations:

$$x - y = y - z \dots\dots\dots (1)$$

$$x - 6 = 2(y - z) \dots\dots\dots (2)$$

**From equation 1:**

$$x = 2y - z$$

Substitute  $x = 2y - z$  into equation 2

We have:

$$2y - z - 6 = 2y - 2z$$

$$z = 6$$

Eva is 6 now.

### Question 6: D

The second number (i.e. single digits) multiplied by 24 will give the first numbers in each box. Therefore:  $4 \times 24 = 96$

### Question 7: C

The novel had 555 pages in total and Jones is able to read 55.5 pages in an hour.

Therefore it should take him **10 hours** to cover 555 pages (i.e.  $555/55.5=10$ ).

Stopped: 5:55pm i.e. 17:55 (time as per the 24-hour clock format)

– 10:00

**7:55**

### Question 8: B

10:46 pm - 6:57 pm.

The subtraction will be easier if both times were converted into minutes

10 hours 46 minutes: 646 min

6 hours 57 minutes: - 417 min

**229n**

### Question 9: E

Two out of a total of fourteen were black.

$$\frac{2}{14} = \frac{1}{7}$$

**Question 10: D**

We are adding the first two numbers in the series to get the third ( $1 + 2 = 3$ ), and then the second and third to get the fourth ( $2 + 3 = 5$ ) etc.

Therefore to get the missing numbers:

$$5 + 3 = 8 \text{ and } 21 + 13 = 34$$

**Question 11: C**

**100** 103 101 104 102 105 103 106

**The missing number in the following series is 100 because:**

The series alternates the following operations minus four (+3) and plus two (-2)

$$\text{Therefore } 100 + 3 = 103$$

$$103 - 2 = 101$$

$$101 + 3 = 104$$

$$104 - 2 = 102$$

$$102 + 3 = 105$$

$$105 - 2 = 103$$

$$103 + 3 = 106$$

From the foregoing the missing number represented by x can be found by reversing the first operation by subtracting 3 from 103 to get x i.e.  $x = 103 - 3 = 100$

**Question 12: B**

Refer to the completed grid below. From top to bottom, the pattern is +5, +12

12	26	18
17	31	23
29	43	35

**Question 13: D**

The formula for speed:

$$\text{Speed}(s) = \text{distance}(d) / \text{time}(t)$$

Let's solve from the known to the unknown:

**Return Trip:**

$$s = 680$$

$$t = 8$$

$$680 = d/8$$

$$d = 680 \times 8$$

$$= 5,440$$

The distance involved is 5,440 km.

**Trip:**

$$s = 544$$

$$d = 5440$$

$$t = ?$$

$$544 = 5440/t$$

$$t = 10$$

Therefore the trip to London took 10 hours.

#### Question 14: C

Simple interest formula:

Simple interest ( $I$ ) = Principal ( $P$ )  $\times$  Rate ( $R$ )  $\times$  Time ( $T$ )

$$P = \$16,000$$

$$R = 9/100$$

$$T = 90/360 \text{ (Note: September 6 to December 5 equals 90 days)}$$

$$I = \$16,000 \times 9/100 \times 90/360$$

$$= \$360.00$$

On December 5, Alan must pay **\$16,360** (principal: \$16,000 + Interest: \$360)

#### Question 15: C

The most logical answer following from the pattern of numbers in each rectangle is 9

**Operations in rectangle 2:**

$$650 - 40 = 610$$

$$13 - 4 = 9$$

**Operations in rectangle 3:**

$$610 - 30 = 580$$

$$9 - 3 = 6$$

**Operations in rectangle 4:**

$$580 - 20 = 560$$

$$6 - 2 = 4$$

#### Question 16: C

Refer to the completed number grid. The pattern from top to bottom is +13, +12

104	117	128
117	<b>130</b>	141
129	142	<b>153</b>

**Question 17: B**

To change Australian money to foreign money - multiply by the exchange rate.

**FOREIGN CURRENCY = AUSTRALIAN CURRENCY  $\times$  EXCHANGE RATE**

One AUD is 1.63 GHC (as per the exchange rate table)

$$= 700 \times 1.63 = 1,141$$

1,141 rounded to the nearest hundreds is 1,100

June will get about **1,100 GHC**

**Question 18: C**

One AUD is 0.66 Pounds.

$$\text{So } 680 \text{ Pounds} = 680 \div 0.66 = 1,030.30303$$

Answer rounded to two decimal places:

**AUD 1,030.30**

**Question 19: B**

If  $\frac{1}{5}$  or 20% of Martin's salary equals \$4,600, then 100% of the salary is equal to **\$23,000** (given by  $(4,600 \times 100) \div 20$ )

Alternative method:

Let S represent the yearly salary

$$\frac{1}{5} S = \$4,600$$

$$S = \$4,600 \times 5$$

$$S = \textbf{\$23,000}$$

**Question 20: D**

Let the letter p represent phones

Paulo: 7p

Pablo: p

$$7p + p = 280$$

$$8p = 280$$

$$p = 280/8$$

$$p = 35 \text{ (Pablo)}$$

**Question 21: A**

Through trial and error you will observe the following pattern: that the **multiplier 3** and the **subtrahend 3** alternate. Therefore the first number (3) multiplied by 4 equals **12**.

$$\text{The first term } 70 \times 3 = 210$$

$$210 - 3 = 207$$

These two operations alternate.

$$\text{Therefore to get the missing number } 621 - 3 = \textbf{618}$$

**Question 22: B**

Let x represent the total number of tennis balls there are in the sack.

$$\frac{1}{2}x: \text{green}$$

$$\frac{1}{4}x: \text{blue}$$

$$\frac{1}{6}x: \text{yellow}$$

$$\frac{1}{2}x + \frac{1}{4}x + \frac{1}{6}x + 52 = x$$

$$\frac{11}{12}x + 52 = x$$

$$52 = x - \frac{11}{12}x$$

$$52 = \frac{1}{12}x$$

$$x = 624$$

$$\frac{1}{6} \times 624 = 104: \text{yellow tennis balls}$$

**Question 23: D**

The division of a whole number X by 15 gives a quotient of 13 and a remainder of 4. Find X.

$$X/15 = 13\frac{4}{15} = ((13 \times 15) + 4)/15 = 199/15$$

$$X = 199.$$

**Question 24: D**

Through trial and error you will observe the following pattern: that the multiplier 5 and the addend 7 alternate. Therefore the first number (5) multiplied by 5 equals

25.

**Question 25: C**

The fifth, sixth and seventh numbers in the sequence: 36, 42 and 48 change by the number 6. The numbers in the sequence are multiples of 6.

The first four in the sequence: 12, 18, 24, 30

The eighth to eleventh are as follows: 54, 60, 66, 72

We are to find the sum of the mean and median of all eleven numbers in the sequence:

$$42 + 42 = 84$$

**Mean:** (average)

$$\frac{12+18+24+30+36+42+48+54+60+66+72}{11} = 42$$

**Median** (middle number)

42

12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72

**Question 26: E**

Calculating the relationship between existing numbers, you will find that  $216/36 = 6$  and  $1,296/216 = 6$ . It follows from there that each number is multiplied by 6 to get the next.

Therefore to get the missing number, the number next to the missing number should be divided by 6 to find the missing number i.e.  $? \times 6 = 36$

$$? = 36/6$$

$$= 6$$

**Question 27: A**

Through trial and error we can see that the numbers in the other three boxes follow this pattern:  $x, 7x, 7x^3$ .

Where the first number (represented by  $x$ ) is multiplied by 7 (i.e.  $7 \times x$ ) to get the second ( $7x$ ) and the second number is cubed ( $7x^3$ ) to get the third number.

It follows from there that  $5 \times 7 = 35$

$$3^3 = 42875 \text{ (third term in the second box)}$$

**Question 28: D**

The rent was 40% or  $2/5$  of his salary (i.e.  $1 - 3/5$ ).

If \$1,270 represented 40% of Gibby's salary then 100% or the total salary amount will be \$3,175 (given by  $(1,270 \times 100)/40$ )

**Question 29: C**

$$600 \times 25/100 = \$150$$

$$\$600 - \$150 = \$450 \text{ (discounted price)}$$

$$\$450 \times 15/100 = \$67.50$$

$$\$450 - \$67.50 = \$382.50 \text{ (final price)}$$

**Question 30: C**

Let  $P$  represent the price before the first discount.

$$P - \left(\frac{20}{100} \times P\right) = P - \frac{1}{5}P = \frac{4}{5}P$$

$$\left(\frac{4}{5}P\right) - \left(\frac{4}{5}P\right) \left(\frac{1}{5}\right) = 20$$

$$\frac{4}{5}P - \frac{4}{25}P = 20$$

$$\frac{16}{25}P = 20$$

$$P = \frac{20 \times 25}{16}$$

$$P = \frac{500}{16}$$

$$P = \$31.25$$

Therefore the price of the headphones before the first discount is \$31.25

### Question 31: D

The **first step** is to find out what percentage the remaining workers (85) constitute:

Let  $x$  represent the percentage of workers who are 40 years or older (i.e. 85 workers)

**60%** < 35 years old

$\frac{1}{25} = 4\%$  = 35 years old

35 years old <  $\frac{1}{50} = 2\%$  < 40 years old

$60\% + 4\% + 2\% + x = 100\%$

$66\% + x = 100\%$

$x = 100\% - 66\%$

$x = 34\%$

The second step is to calculate how many workers (represented by  $y$ ) constitute 4%

If 85 workers: 34%

Then  $y$  workers: 4%

$y =$  **10 workers**

### Question 32: C

If 25% of the students at Westgate High were given prizes at the schools last speech and prize giving day for good academic performance, the 180 that got no prize represent 75% of students at Westgate High. If 180 students represent 75% of the total number of students, then the total number of students (100%) at the school must equal **240** given by:  $(100 \times 180)/75 = 240$

### Question 33: B

Let  $x$  = blue candles, then  $(3/4)x$  = orange candles.

Remember the word “as” in this context refers to multiplication.

$\frac{3}{4}x + x = 490$

$\frac{7}{4}x = 490$

$x = (490 \times 4)/7$

$x = 280$

### Question 34: A

Through trial and error you will find the following pattern: that each number is divided by 6 to get the next. Therefore  $120 \div 6 = 20$

**Question 35: D**

**81, G**

The answer here can best be found through observation and trial and error.

**Numbers:**

The amount added to subsequent numbers in the series reduced by 1 each time.

$$64 + 9 = 73$$

$$73 + 8 = 81$$

$$81 + 7 = 88$$

$$88 + 6 = 94$$

The missing number is 81.

**Alphabets:**

The series alternates numerals with alphabets; with the alphabets it starts from the letter 'A' and every other alphabet is skipped. The missing alphabet is 'G'

**Question 36: C**

$$30\% \text{ of } \$70.70 = \$21.21$$

$$\$70.70 + \$21.21 = \$91.91$$

**Question 37: D**

Cost of smooth white sand:

$$6\frac{1}{2} \times \$300 = \frac{13}{2} \times \$300 = \$1,950$$

Cost of rough sand:

$$3\frac{1}{3} \times \$270 = \frac{10}{3} \times \$270 = \$900$$

$$\begin{array}{r} \text{Total cost} \\ \$2,850 \end{array}$$

$$\text{What Anna must pay } \frac{1}{5} \times \$2,850 = \$570$$

**Question 38: C**

Let **b** represent the number of brand new mini buses ordered.

**20 – b** represents the number of second-hand mini buses ordered.

$$8,000b + 3,500(20 - b) = 106,000$$

$$8,000b + 70,000 - 3,500b = 106,000$$

$$4,500b + 70,000 = 106,000$$

$$4,500b = 106,000 - 70,000$$

$$b = \frac{36,000}{4,500}$$

$$b = 8$$

20 - b: second hand buses ordered

$$20 - 8 = 12$$

Express Transport Company ordered **8** brand new mini buses and **12** second-hand mini buses.

**Question 39: C**

The unit cost was \$3,500 for the second-hand minibuses.  
12 second-hand mini buses were ordered.  
The dollar cost of the second-hand mini buses ordered:  
 $12(\$3,500) = \$42,000$

**Question 40: E**

7      6      14      12      21      18      28      24  
The series above alternates the first 4 multiples of the numbers 7 and 6.  
The missing number therefore is 6

**Question 41: C**

Through observation and trial and error, we can see the following operations at work:  
 $209 - 21 = 188$   
 $188 - 19 = 169$   
 $169 - 17 = 152$   
 $152 - 15 = 137$   
 $137 - 13 = 124$   
The amount deducted kept reducing by 2

**Question 42: B**

Draw a vertical line and place the values in order accordingly.

John must be above Sam in the line and Martin and Tony must both be above John

Martin	Tony	→ We don't know which order Martin and Tony are yet
John		
Sam		

The next statement 'Nat is younger than Sam' shows that she is the youngest. The order in which Martin and Tony are placed is irrelevant.

Number the statements (3 in the question):

- 1: John is older than Sam but younger than both Martin and Tony.
  - 2: Martin is younger than Tony.
  - 3: Nat is younger than Sam.
- The logical answer is Nat.

**Question 43: D**

$n$  = number of workers in each department

$20n$  = number of workers in the whole company

**Workers absent:**

10 departments-  $10 \times (1/2) n = 10n/2 = 5n$

6 departments -  $6 \times (1/4) n = 6n/4 = (3/2) n$

4 departments-  $4 \times (1/4) n = 4n/4 = n$

$5n + (3/2) n + n = 150$

$(15/2) n = 150$

$n = 20$

Therefore the total number of workers at this company if there were no were no absentees:

$= 20n$

$= 20 \times 20$

$= 400$

**Question 44: A**

Let  $n$  represent the number of lollies Paulo started with.

**Paulo gave half of his lollies to Pablo:**

$n/2$

**Pablo gave half of his lollies to Paulina:**

$(n/2)/2 = n/4$

**Paulina gave  $\frac{1}{4}$  of her lollies to Paulette and kept the remaining 27:**

$((n/4) \times \frac{1}{4}) = n/16$

$(n/4) - n/16 = 27$

$4n - n = 432$

$n = 144$

**Question 45: D**

$90,000/60 = 1,500$

**1,500m/hour**

Note:  $1,000m = 1km$

**Question 46: D**

Let  $X$  represent the unknown number

$X/2 - 8 = 2/3(X) + 7$

$X/2 - 2/3(X) = 7 + 8$

$-(1/6) X = 15$

$-X = 90$

$X = -90$

**Question 47: B**

Let Ama's mum's age =  $x$

Ama's mum's age is  $x$ , so twice her age is  $2x$ , and 13 more than twice her age is  $13 + 2x$ , that equals 67

Solve for  $x$ :  $13 + 2x = 67$

$$2x = 67 - 13$$

$$x = 54/2$$

$$x = 27$$

Check:

$$2 \times 27 + 13 = 54 + 13 = 67$$

**Question 48: D**

**There is a catch:** the phrase "two facing pages" means these are consecutive pages therefore, numbers. Let assign the variable  $n$ ,  $(n+1)$  to these consecutive numbers.

$$n(n+1) = 600$$

$$n^2 + n = 600$$

$$n^2 + n - 600 = 0 \text{ (Quadratic Equation)}$$

$$(n - 24)(n + 25) = 0$$

$$n = 24, -25$$

$n$  is not negative, therefore  $n = 24$

Numbers:  $n$ ,  $(n+1)$

$$24(24+1)$$

**24, 25**

**Question 49: C**

Markup expressed in dollars:

$$\text{Selling price } (\$2,250) = \text{Cost } (\$1,500) + \text{Markup } (\$750)$$

**Markup:**

$$(50/100) \times \$1,500 = \$750$$

**Sales Tax:**

$$(5/100) \times \$2,250 = \$112.50$$

Therefore, Roger paid a final price of **\$2,362.50** ( $\$2,250 + \$112.50$ ) – the sum of selling price and sales tax.

**Question 50: C**

If you have the total cost of a product (Base cost + GST)-\$390.50 in this question, this is how you work out how much GST was charged:

$$\text{Total cost} / 1.1 = \text{Base price: } \$390.50 / 1.1 = \$355$$

$$\text{Total cost} - \text{Base price} = \text{GST: } \$390.50 - \$355 = \textbf{\$35.50}$$

Where 1.1 is derived from  $10\% + 1$  (provided GST is 10%)

**Note:** The answer can easily be arrived at without the aid of a calculator but instead employing fractions, long divisions and cancellations.