GB ASSESSMENT TEST

OBJECTIVE TEST

1.B	6. A	11. A	16.D	21.C	26.A	31.C	36.A
2. D	7. A	12. A	17.B	22.A	27.D	32.C	37.B
3.C	8. D	13.C	18.D	23.D	28.C	33.A	38.C
4. B	9. B	14.B	19.D	24.A	29.C	34.D	39.D
5 .C	10.D	15.C	20.C	25.A	30.C	35.B	40.A

THEORY

Q no	SOLUTION

1	. (a) n(U) = 30
	    n(A) = (x + 10)
	    n(S) = (10x+3)
	    n(A n S) = 4
	    n(A u S^I) = 2x
	    n(A u S)^I = 3
	Let n(U) = Number of students in the class
	    n(A) = Number of students who study Algebra
	    n(S) = Number of students who study statistics
	    n(A n S) = Number of students who study both Algebra and statistics
	    n(A u S^I)= Number of students who study Algebra only
	    n(A u S)^I = Number of students who study neither Algebra nor statistics M1
	    i.
	
	n (A) = x +10 n(S) = 10x +3 n(U) = 30
	2x 4 3 M1
	
	ii. 2x + 4 + (10x-1) + 3 =30
	    2x + 4 + 10x – 1 + 3 = 30 M0.5
	    2x+ 10x = 30 – 4 + 1 -3 M0.5
	    12x= 24
	    $\frac{12x}{12} = \frac{24}{12}$
	    $\frac{12x}{12} = \frac{24^2}{12}$
	    x = 2 A1
	α. Algebra = x +10
	    substituting x = 2
	    Algebra = 2 + 10
	    n(A) = 12 Students A0.5
	β. Only Statistics = 10x – 1
	    substituting x = 2
	    Only statistics = 10(2) – 1
	        = 20 – 1

= 19 students   A0.5

iii. Statistics = 10x + 3
Substituting x = 2
Statistics = 10(2) + 3
= 20 + 3
= 23 Students   M0.5

P(statistics) = $\frac{\text{number of students studying statistics}}{\text{total number pf students}}$

P(statistics) = $\frac{23}{30}$ A0.5

(b) KE = $\frac{1}{2}$ mv^2

2 x KE = 2 x $\frac{1}{2}$ mv^2 M 0.5

2KE = mv^2

$\frac{2KE}{m} = \frac{mv^2}{m}$ M0.5

$\frac{2KE}{m} = \frac{\cancel{m}v^2}{\cancel{m}}$

$v^2 = \frac{2KE}{m}$

v= $\sqrt{\frac{2KE}{m}}$ A1

(c) $\frac{2^8 \times 3^7}{3^5 \times 2^5}$

$\frac{2^8 \times 3^7}{2^5 \times 3^5}$ M0.5

2^{8-5} x 3^{7-5} M0.5
$2^3 \times 3^2$ M0.5
8 x 9
72   M0.5
7.2 x 10   A1

(d) . i. <EGB + < DEG = 180°   M0.5
<EGB + 27° = 180°
< EGB = 180° - 27°
<EGB= 153°   **A0.5**

ii. <DEI and <EIH are alternative angles = 27°
<EIH is vertically opposite to < JIG =27°
Therefore x=27°
2x + y + 27 = 180°   M0.5
Substitute x= 27°
2 (27) + y +27 = 180   M0.5
54 + y +27 = 180
y = 180 – 54 – 27
y =99°   **A1**

(iii) Triangle EHI is a **scalene triangle. A1**

2 | (a)

i. Curved surface area of a cone = πrl   M0.5
π =$\frac{22}{7}$

r = 7cm
l = 11cm
= $\frac{22}{7}$ x 7 x 11   M0.5

$$= 22 \times 11 \qquad \text{M0.5}$$
$$= 242 \ cm^2 \qquad \text{A1}$$

ii. Volume of a cone $= \frac{1}{3}\ \pi r^2 h$ M0.5

$$\pi = \frac{22}{7}$$
$$r = 7 \ cm$$
$$h = 9 \ cm$$

volume of a cone $= \frac{1}{3} \times \frac{22}{7} \times 7^2 \times 9$ M0.5

$$= 22 \times 7 \times 3 \qquad \text{M0.5}$$
$$= 462 \ cm^3 \qquad \text{A1}$$

(b)
```
      1074
   4 | 4296
     -4
     ‾‾‾
      029
     -28
     ‾‾‾
       16
      -16
      ‾‾‾
       --                        A3
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$$4296 \div 4 = 1074$$
The quotients of 4296 and 4 is 1074

(C)
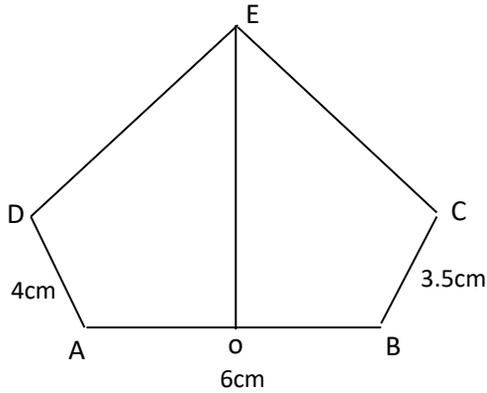
i. [AB]=6cm, [BC]=8cm, $\angle ABC = \angle BAD = 120^\bullet$ *A2*
IBCI = 3.5cm and IADI = 4cm   *A2*
Completing pentagon and   allocating A, B, C, D and E   *A1*

iii.
  α. $|CE| = 7cm$ M0.5
    $|DE| = 6.9cm$ M0.5

  β. $\angle$ADE $= 101°$ M0.5
    $\angle$BCE$= 105.5°$ M0.5

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3 (a) i.   convert 0.08km to m
    1 km = 1000m
  0.08 km = 0.08 x 1000
        = 80 m   M0.5

Radius $= \dfrac{d}{2}$

  $= \dfrac{56}{2}$

$= 28$ m   M0.5
Perimeter of semi-circle $= \pi r$

$$= \frac{22}{7} \times 28$$
$$= 88 \text{ m} \qquad \text{M0.5}$$

Perimeter of plot = IABI + IBCI + ICEI + IEFI + IFGI + IGAI

$\qquad$ = 80m + 56m + 88m + 56m + 75m + 70m $\qquad$ **M0.5**

$\qquad$ **= 425m** $\qquad\qquad\qquad\qquad\qquad$ **A0.5**

ii.

$\quad$ Area $_A = \frac{1}{2}$ (a + b) x h $\qquad\qquad$ M0.5

$\qquad\quad = \frac{1}{2}$ (70 + 56) x 80 $\qquad\qquad$ M0.5

$\qquad\quad = \frac{1}{2}$ (126) x 80 $\qquad\qquad$ M0.5

$\qquad\quad = 63 \times 80$

$\qquad\quad$ **= 5040m²** $\qquad\qquad\qquad$ **A0.5**

$\quad$ Area $_B$ = L X L

$\qquad\quad = 56 \times 56$ $\qquad\qquad$ M0.5

$\qquad\quad$ **= 3136 m²** $\qquad\qquad$ A0.5

$\quad$ Area $_C = \frac{1}{2}$ x πr ^{2}

$\qquad\quad = \frac{1}{2}$ **x** $\frac{22}{7}$ **x 28 x 28** $\qquad$ **M0.5**

$\qquad\quad = 11 \times 4 \times 28$

$\qquad\quad$ **= 1232 m²** $\qquad\qquad$ **M0.5**

Total area of plot = Area $_A$ + Area $_B$ + Area $_C$

$\qquad\qquad = 5040m^2 + 3136 \ m^2 + 1232 \ m^2$ $\qquad$ M0.5

$\qquad\qquad$ **= 9408m²** $\qquad\qquad\qquad\qquad$ **A0.5**

(b) $\quad \frac{1}{2}$ (y − 2) + 4 ≥ $\frac{5}{6}$ (2y − 1)

$\quad$ Multiply through with L.C.M of 6

$\quad 6 \times \frac{1}{2}$ (y − 2) + 6 × 4 ≥ 6 x $\frac{5}{6}$(2y − 1) $\qquad$ M0.5

$\quad$ 3(y − 2) + 24 ≥ 5 (2y − 1) $\qquad\qquad$ M0.5

$\quad$ 3y − 6 + 24 ≥ 10y − 5

$\quad$ 3y + 18 ≥ 10y − 5

$\quad$ 3y − 10y ≥ -5 − 18 $\qquad\qquad\qquad$ M0.5

$\quad$ -7y ≥ -23

$\quad \frac{-7y}{-7} \geq \frac{-23}{-7}$

$\quad = \frac{-7y}{-7} \geq \frac{-23}{-7}$

$\quad y \leq \frac{23}{7}$

$\quad y \leq 3 \frac{2}{7}$

$\qquad\qquad\qquad$ A1
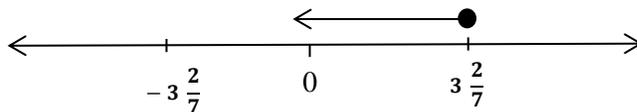
$\qquad\qquad$ $- 3 \frac{2}{7}$ $\qquad$ 0 $\qquad$ $3 \frac{2}{7}$ $\qquad\qquad$ A1

(c) $\quad$ Nayeram's age = x

$\qquad$ Osei's age = x + 5

$\qquad$ Nayeram's age = 15 years $\qquad$ M0.5

$\qquad$ Osei's age = 15 + 5

$\qquad\qquad$ = 20 years $\qquad\qquad$ M0.5

$\qquad$ Sum of other ages = 15 + 20

	= 35 years	A0.5

(d) $a^2 b^3 - (ab)^2$

substitute $a = -2$, $b = 3$

$\quad (-2)^2 (3)^3 - (-2 \times 3)^2$ M0.5

$\quad (4)(27) - (-6)^2$ M0.5

$\quad 108 - (36)$ M0.5

$\quad = 72$ **A1**

4

(a) i. $A = \begin{pmatrix} 4 \\ 8 \end{pmatrix}$, $B = \begin{pmatrix} 4 \\ 12 \end{pmatrix}$ and $C = \begin{pmatrix} 6 \\ 10 \end{pmatrix}$,

ii. y-axis as a mirror line $\begin{pmatrix} x \\ y \end{pmatrix} \rightarrow \begin{pmatrix} -x \\ y \end{pmatrix}$

$A = \begin{pmatrix} 4 \\ 8 \end{pmatrix} \rightarrow A_1 = \begin{pmatrix} -4 \\ 8 \end{pmatrix}$

$B = \begin{pmatrix} 4 \\ 12 \end{pmatrix} \rightarrow B_1 = \begin{pmatrix} -4 \\ 12 \end{pmatrix}$

$C = \begin{pmatrix} 6 \\ 10 \end{pmatrix} \rightarrow C_1 = \begin{pmatrix} -6 \\ 10 \end{pmatrix}$

iii. anti-clockwise rotation of $90°$ $\begin{pmatrix} x \\ y \end{pmatrix} \rightarrow \begin{pmatrix} -y \\ x \end{pmatrix}$

$A = \begin{pmatrix} 4 \\ 8 \end{pmatrix} \quad A_2 = \begin{pmatrix} -8 \\ 4 \end{pmatrix}$

$B = \begin{pmatrix} 4 \\ 12 \end{pmatrix} \quad B_2 = \begin{pmatrix} -12 \\ 4 \end{pmatrix}$

$C = \begin{pmatrix} 6 \\ 10 \end{pmatrix} \quad C_2 = \begin{pmatrix} -10 \\ 6 \end{pmatrix}$
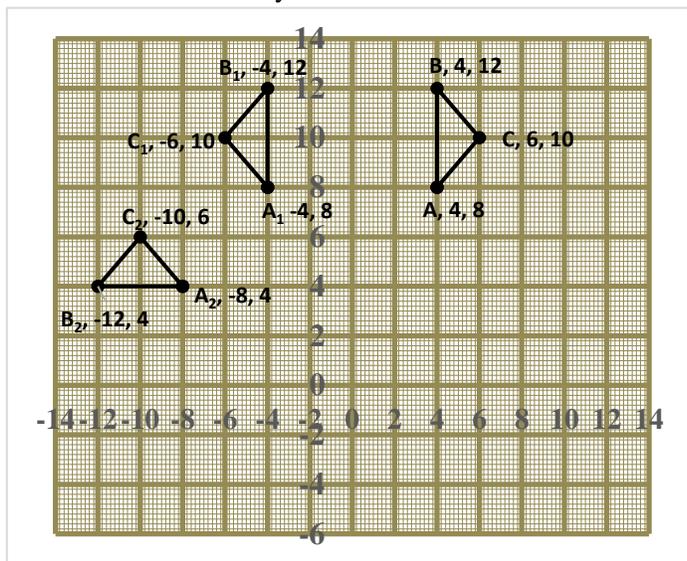
y - axis

Vertical axis	B1
Horizontal axis	B1
Correct point plotted	B2
y-axis as mirror	B1
anticlockwise	B1
correct scale	B1

(b) $|BC|^2 = |AB|^2 + |AC|^2$

$\quad (5x)^2 = 3^2 + 4^2$ M0.5

$\quad 25x^2 = 9 + 16$ M0.5

$\quad 25x^2 = 25$

$\quad \dfrac{25x^2}{25} = \dfrac{25}{25}$ M0.5

$\quad \dfrac{25x^2}{25} = \dfrac{25}{25}$

$\quad x^2 = 1$ M0.5

$\sqrt{x}^2 = \sqrt{1}$

x = 1   **A1**

(c) $(2x – 4)^2 – (x + 5)^2$

$(2x – 4)(2x - 4) – (x + 5)(x+5)$ M0.5

$(4x^2 – 8x – 8x + 16) – (x^2 + 5x + 5x + 25)$

$(4x^2 – 16x + 16) – (x^2 + 10x + 25)$ M0.5

$4x^2 – 16x + 16 – x^2 - 10x – 25$

$4x^2 – x^2 – 16x - 10x + 16 - 25$ M0.5

$3x^2$ - 26x - 9   **M1**

OR

Let $(2x -4) = A$

$(x + 5) = B$

$A^2 – B^2 = (A + B)(A – B)$

$A + B = 2x – 4 + x + 5$

$= 2x + x – 4 + 5$

$= 3x + 1$

$A – B = 2x – 5 – (x + 5)$

$= 2x – 4 – x – 5$

$= 2x – x – 4 -5$

$= x – 9$

$(A + B)(A – B) = (3x + 1) (x – 9)$

$= 3x^2 – 27x – x – 9$

$= 3x^2$ - 26x - 9

(d)   284687.3

     +   258.4689   M0.5
     ─────────────────
          284945.7689   M0.5
     ─────────────────
     Place value of 2 = 200000   A1

5

. (a)

$a = \begin{pmatrix} 2x + 1 \\ y + 3 \end{pmatrix}$

$b = \begin{pmatrix} 4 \\ 4 \end{pmatrix}$

$a = 2b$ M0.5

$\begin{pmatrix} 2x + 1 \\ y + 3 \end{pmatrix} = 2\begin{pmatrix} 4 \\ 4 \end{pmatrix}$

$\begin{pmatrix} 2x + 1 \\ y + 3 \end{pmatrix} = \begin{pmatrix} 8 \\ 8 \end{pmatrix}$ M0.5

$2x + 1 = 8$

$2x = 8 – 1$ M0.5

$2x = 7$

$\frac{2x}{2} = \frac{7}{2}$

$\frac{2x}{2} = \frac{7}{2}$

$x = \frac{7}{2}$ A0.5

                    $Y + 3 = 8$ M0.5

$Y = 8 – 3$

$Y = 5$ A0.5

(b) Amount shared = GH ¢ x

Amount Hayford received = GH ¢ 8000

Total ratio = 5 + 4

            = 9   B1

Amount shared

If 4 = 8000

$9 = \frac{800 \times 9}{4}$ M0.5

$$= 2000 \times 9$$
$$= GH\ 1800 \qquad\qquad\qquad A0.5$$

Frank's share $= \frac{5}{9} \times \cancel{18000}^{2000}$

$$= GH\ ¢10000.00 \qquad\qquad M0.5$$

Frank's share as a percentage $= \frac{1000}{1800}X\ 100 \qquad\qquad M0.5$

$$= \frac{1000}{18} = \frac{500}{9} \qquad\qquad M0.5$$

$$= 55.56\ \% \qquad\qquad A1$$

OR

Total ratio $= 5 + 4$
$$= 9$$
Frank ratio $= 5$

Frank's share as a percentage $= \frac{5}{9} \times 100$
$$= \frac{500}{9}$$
$$= 55.56\%$$

(c) Factors of 88 = {1, 2,4,8,11,22,44,88}   M1
 Factors of 143 = {1, ,11,13,143}   M1
 Factors of 165= {1,3, 5,11,15,33 ,55,165}   M1
 Common factors = {1, ,11}
 H.C.F = {11}   A1

(d) i α.μ = {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12}   M0.5
 X = { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12}   M0.5
 Y = { 1, 3, 5, 9, 11}   M0.5
 β. (X u Y)^1
 X u Y = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12}   M0.5
 (X u Y) ^{1} = {0}   A1
 ¥. (X n Y) = {1, 3, 5, 7, 9, 11}   A1
 (ii) P (selecting an event number) $= \frac{number\ of\ even\ numbers}{total\ numbers}$

$$= \frac{6}{13} \quad A0.5$$

6	(a) i. Total angle $= 360^0$

(a) i. Total angle $= 360^0$
 Let x = angle of rice.
 $x + 60^0 + 70^0 + 50^0 + 80^0 = 360^0$ M0.5
 $x + 260^0 = 360^0$
 $x = 360^0 - 260^0$
 x = 100^0   **M0.5**
 ii. $50^0 = 250$
 $360^0 = x$
 $50x = 360 \times 250$ M0.5
 $50x = 90,000$
 $\frac{50x}{50} = \frac{\cancel{90,000}^{1800}}{50}$
 x = 1800 cereals   **A0.5**
 iii. Number of rice
 $= \frac{100}{360}$ x 1800   M0.5
 $= \frac{100 \times 1800}{360}$

= 500   **M0.5**
500 x100
1800   M0.5
27.78% (correct to 2d)   A0.5

(b) If the last odd number is = 2x-1
   Then the first odd number = 2x-5   M0.5
      the second odd number= 2x-3   M0.5

  2x-5+2x-3+2x-1= 33   M0.5
  2x + 2x + 2x – 5 – 3 -1 = 33
  6x – 9 = 33
  6x = 33+ 9
  6x = 42
$\frac{6x}{6} = \frac{42}{6}$
$\frac{6x}{6} = \frac{42^7}{6}$
   x = 7   M0.5
 the first odd number   = 2(7) – 5 = 14 – 5 = 9   A1
 the second odd number = 2(7) – 3= 14 – 3 = 11   A1
 the last odd number   =2(7) – 1 = 14 – 5 = 13   A1

      OR
  First number = x
  Second number = 2 + x
  Third number = 4 + x
x + (2 + x) + (4 + x) = 33
 x + 2 + x + 4 + x = 33
 3x + 6 = 33
 3x = 33 – 6
 3x = 27
$\frac{3x}{3} = \frac{27}{3}$
$= \frac{3x}{3} = \frac{27^7}{3}$
= x = 7
 the first odd number   = 2(7) – 5 = 14 – 5 = 9
  the second odd number   = 2 + 9 = 11
  the last odd number   =4 + 9 = 13

(c) i.   25.67g to kg
    If 1000g = 1 kg
     25.67g =   ?
   $\frac{25.67 \times 1}{1000} = \frac{25.67}{1000}$ M0.5
    = 0.02567kg   A0.5

  ii.   -pq – pr + mq + mr
     (-pq – pr) + (mq + mr)   M0.5
    -p (q + r) + m(q+r)
     (q + r) (m - p)   A0.5

(d) i. Volume of pipe = $\pi r^2 h$ B0.5
      = $\frac{22}{7}$ x 7^2 cm (28cm)   M0.5

     = $\frac{22}{7}$ x 7 x 7 x 28
    = 22 x 7 x 28
    = 4312cm³   **A0.5**
  Outside radius – R
  3 : 4 = 7 : x

$$\frac{3}{4} = \frac{7}{x}$$

R = $\frac{28}{3}$ = 9.3 cm   M0.5

ii. Cross sectional area of the pipe

$\pi R^2 - \pi r^2$

$\frac{22}{7}$ x $(9.3cm)^2$ – $\frac{22}{7}$x $(7cm)^2$ M0.5

$\frac{22}{7}$ x $86.49cm^2$ – $\frac{22}{7}$ x $49cm^2$ M0.5

271.826 – 154
= **117.826cm²**   **A1**