



Course 11 METHODS Year 11

Student name: Murkina, K.Y. Teacher name: _____

Task type: Test 1 Weds week 2 2021

Time allowed for this task: 40 mins

Number of questions: _____

Materials required: No calculators nor classpads

Standard items: Pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: Drawing instruments, templates (No notes allowed)

Marks available: 42 marks & 7 questions

Task weighting: 10 %

Formula sheet provided: No

Note: All part questions worth more than 2 marks require working to obtain full marks.

Q1 (1, 1, 2, 3, 3, 3 & 4 = 17 marks) (1.1.6)

Solve the following linear equations showing full working.

<p>a) $7x - 11 = 5x$</p> $2x = 11$ $x = \frac{11}{2} \text{ or } 5.5$	<p>b) $6x + 7 = 10 - 4x$</p> $10x = 3$ $x = \frac{3}{10} \text{ or } 0.3$
<p>c) $2(1 + 3x) = 9x - 2$</p> $2 + 6x = 9x - 2$ $4 = 3x$ $x = \frac{4}{3}$	<p>d) $x + 7 = \frac{5}{2}x$</p> $\frac{3}{2}x = 7$ $x = \frac{14}{3}$
<p>e) $\frac{5x-3}{3} = \frac{8x+1}{6}$</p> $6(5x-3) = 3(8x+1)$ $30x - 18 = 24x + 3$ $6x = 21$ $x = \frac{7}{2}$ <p>OR 3.5</p>	<p>f) $\frac{x}{4} + \frac{x}{5} = 7$</p> $\frac{5x}{20} + \frac{4x}{20} = \frac{140}{20}$ $9x = 140$ $x = \frac{140}{9}$
<p>g) $\frac{3y-1}{2} + \frac{5y+2}{4} = y$</p> $\frac{2(3y-1)}{4} + \frac{5y+2}{4} = \frac{4y}{4}$ $6y - 2 + 5y + 2 = 4y$ $7y = 0$ $y = 0$	

Q2 (2 & 2 = 4 marks) (1.1.6)

\$1200 is divided between three students A, B & C. Student A receives one third the amount that student B receives and student C receives twice the amount of student A. Let x equal the amount that student B receives.

a) Write the above as a linear equation in terms of x .

$$x + \frac{1}{3}x + \frac{2}{3}x = 1200$$

b) Solve for x and hence state the amount that each student receives.

$$2x = 1200$$

$$x = 600$$

\therefore Student B receives \$600, Student A receives \$200 and Student C receives \$400.

Q3 (2 & 2 = 4 marks) (1.1.6)

Three consecutive even numbers add up to 366.

a) By introducing a variable x , express the above statement as a linear equation for x .Let x be an integer such that:

$2x$, $2x+2$ and $2x+4$ are three consecutive even numbers.

$$\therefore 6x+6 = 366$$

b) Solve for x and hence state the three even numbers.

$$6x+6 = 366$$

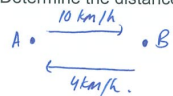
$$6x = 360$$

$$x = 60$$

Thus the three even numbers are 120, 122 and 124.

Q4 (4 marks) (1.1.6)

A woman travels at 10 km/h from A to B and from B to A at 4 km/h. The total journey takes 90 minutes. Determine the distance travelled.

Note: $AB = BA$.

$\therefore 10x = 4y$
where x is the time taken to travel from A to B and y is the time taken to travel from B to A (both in hours).

Q5 (3 & 3 = 6 marks) (1.1.6)

Solve the following.

$$\begin{aligned} \text{a)} \\ x &= 3y - 5 & -① \\ 3x + 5y &= 13 & -② \end{aligned}$$

Substitute ① into ②

$$\begin{aligned} 3(3y - 5) + 5y &= 13 \\ 9y - 15 + 5y &= 13 \\ 14y &= 28 \\ \therefore y &= 2. \end{aligned}$$

$$\begin{aligned} \therefore x &= 3(2) - 5 \\ &= 6 - 5 \\ &= 1. \\ x &= 1. \end{aligned}$$

$$\begin{aligned} 10x &= 4y & -① \\ x + y &= \frac{3}{2} & -② \\ \therefore x &= \frac{2}{5}y & -③ \\ \text{Substitute ③ into ②} & \therefore \checkmark \\ \frac{2}{5}y + y &= \frac{3}{2} & x = \frac{3}{7} \\ \frac{7}{5}y &= \frac{3}{2} & \checkmark \\ y &= \frac{15}{14} & \checkmark \end{aligned}$$

The distance travelled is $\frac{60}{7}$ km.

$$\begin{aligned} \text{b)} \\ 5x + 2y &= 41 & -① \\ 3x + 5y &= 36 & -② \end{aligned}$$

Multiply ① by 3 and ② by -5, then add the resulting equations:

$$\begin{aligned} 15x + 6y &= 123 \\ -15x - 25y &= -180 \\ \hline -19y &= -57 \\ y &= 3. \end{aligned}$$

$$\begin{aligned} \therefore 5x + 6 &= 41 \\ 5x &= 35 \\ x &= 7 \end{aligned}$$

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Q6 (4 marks) (1.1.6)

Hilary thinks of a two-digit number. The sum of the digits is 14. If she reverses the digits, the new number is 18 less than her original number. Solve for Hilary's original number using simultaneous equations.

Let x and y be the digits of the two-digit number: \overline{xy}

NOTE:

$$\begin{aligned} x + y &= 14 & -① \\ 10y + x &= 10x + y - 18 & -② \\ \therefore y &= 14 - x & -③ \end{aligned}$$

$$\begin{aligned} 10(14 - x) + x &= 10x + 14 - x - 18 \\ 140 - 10x + x &= 10x + 14 - x - 18 \\ -18x &= -144 \end{aligned}$$

$$x = 8.$$

$$\therefore y = 14 - 8 = 6$$

The original number is 86.

Q7 (3 marks) (1.1.6)

Solve for x in terms of the constants a & b for the following. (simplify)

$$\frac{x+a}{b} + \frac{b-x}{a} - 2 = 0$$

$$\frac{a(x+a) + b(b-x) - 2ab}{2ab} = 0$$

$$ax + a^2 + b^2 - bx - 2ab = 0$$

$$ax - bx = -a^2 + 2ab - b^2$$

$$x(a-b) = -(a^2 - 2ab + b^2)$$

$$x = \frac{-(a-b)(a-b)}{(a-b)}$$

$$x = -(a-b)$$

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