Victim: *Mr Solutions*

Well done M.S.!!

$\frac{41}{41}$

1. Give *one example* of each of the following: (**5** /5)

(a) Expression $3x+4$ ✓

(b) Equation that is Solved for the Unknown $3x+4=7$ ✓

(c) Equation that Expresses a Mathematical Relationship $A = 2\pi r^2 + 2\pi rh$ ✓

(d) Identity $x+x=2x$ ✓

(e) A Value that Satisfies the Equation $x^2 = 64$ $x=8$ ✓ or $x=-8$

2. For the given equation, complete the flowchart, solve the equation by performing operations to *both sides* and check your solution. (**10** /10)

Equation	Flowchart	Solve the Equation by Performing Operations to B.S.	Check your Solution	
			L.H.S.	R.H.S.

(a) $\dfrac{3}{2}x+\dfrac{1}{2}=\dfrac{3}{4}$

Rough Work:
$\frac{3}{4}-\frac{1}{2}=\frac{3}{4}-\frac{2}{4}=\frac{1}{4}$

$\frac{1}{4}\div\frac{3}{2}=\frac{1}{4}\times\frac{2}{3}$

$=\frac{2}{12}=\frac{1}{6}$

Flowchart: x → $\times\frac{3}{2}$ → $+\frac{1}{2}$ → $\frac{3}{4}$; $\frac{1}{6}$ ← $\div\frac{3}{2}$ ← $-\frac{1}{2}$ ← $\frac{3}{4}$

Solve:
$\frac{3}{2}x+\frac{1}{2}=\frac{3}{4}$ ✓

$\therefore \frac{4}{1}\left(\frac{3}{2}x\right)+\frac{4}{1}\left(\frac{1}{2}\right)=\frac{4}{1}\left(\frac{3}{4}\right)$

$\therefore \frac{12}{2}x+\frac{4}{2}=\frac{12}{4}$

$\therefore 6x+2=3$ ✓

$\therefore 6x+2-2=3-2$ ✓

$\therefore 6x=1$

$\therefore \frac{6x}{6}=\frac{1}{6}$

$\therefore x=\frac{1}{6}$ ✓

Check — L.H.S.:
$\frac{3}{2}x+\frac{1}{2}$
$=\frac{3}{2}\left(\frac{1}{6}\right)+\frac{1}{2}$
$=\frac{3\div3}{12\div3}+\frac{1}{2}$
$=\frac{1}{4}+\frac{1\times2}{2\times2}$
$=\frac{1}{4}+\frac{2}{4}$
$=\frac{3}{4}$

R.H.S.: $\frac{3}{4}$

Since L.H.S.=R.H.S., $x=\frac{1}{6}$ is the solution ✓✓

3. Solve the given equation by performing operations to both sides. (**9** /9)

$\frac{1}{4}(2y-7)+\frac{y-5}{6}=-3-(5y-8)$ Multiply B.S. by LCD→12

$\therefore \frac{12}{1}\left[\frac{1}{4}(2y-7)\right]+\frac{12}{1}\left(\frac{y-5}{6}\right)=12(-3)-12(5y-8)$ ✓

$\therefore \frac{12}{4}(2y-7)+\frac{12}{6}(y-5)=-36-60y+96$

$\therefore 3(2y-7)+2(y-5)=-60y-36+96$ ✓

$\therefore 6y-21+2y-10=-60y+60$ ✓

$\therefore 8y-31=-60y+60$ ✓

$\therefore 8y-31+60y=-60y+60+60y$ ✓

$\therefore 68y-31=60$

$\therefore 68y-31+31=60+31$ ✓

$\therefore 68y=91$

$\therefore \frac{68y}{68}=\frac{91}{68}$ ✓

$\therefore y=\frac{91}{68}$ ✓

4. Two or more angles are complementary if their sum is 90°. In the diagram at the right, three angles are complementary. One angle is *one-half* of the largest angle. The smallest angle is *one-sixth* of the largest angle. *Use an equation* to find the measure of each angle. (**7**/7)

Let x represent the measure of the largest angle. Then the other angles can be represented by $\frac{1}{2}x$ and $\frac{1}{6}x$.
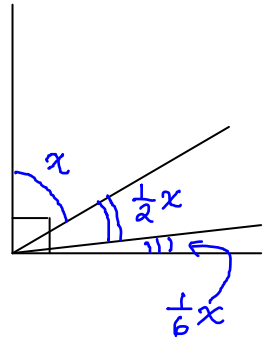
| Sum of the angles | is | $90°$ |

$$x + \tfrac{1}{2}x + \tfrac{1}{6}x = 90$$

$\therefore 6x + \tfrac{6}{1}\left(\tfrac{1}{2}x\right) + \tfrac{6}{1}\left(\tfrac{1}{6}x\right) = 6(90)$

$\therefore 6x + \tfrac{6}{2}x + \tfrac{6}{6}x = 540$

$\therefore 6x + 3x + 1x = 540$

$\therefore 10x = 540$
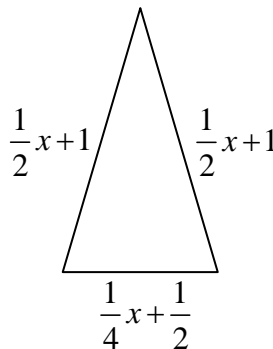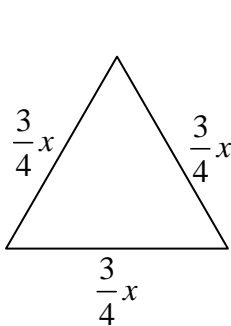
$\therefore \dfrac{10x}{10} = \dfrac{540}{10}$

$\therefore x = 54$

$\therefore \tfrac{1}{2}x = \tfrac{1}{2}(54) = 27$

and $\tfrac{1}{6}x = \tfrac{1}{6}(54) = 9$

The angle measures are $9°, 27°$ and $54°$.

5. The triangles shown below have the *same perimeter*. *Use an equation* to find the side lengths of each triangle. (**10**/10)

Triangle 1 (equilateral): sides $\frac{3}{4}x$, $\frac{3}{4}x$, $\frac{3}{4}x$

Triangle 2 (isosceles): sides $\frac{1}{2}x+1$, $\frac{1}{2}x+1$, $\frac{1}{4}x+\frac{1}{2}$

The perimeter of the equilateral triangle is the same as the perimeter of the isosceles triangle

$$\tfrac{3}{4}x + \tfrac{3}{4}x + \tfrac{3}{4}x = \tfrac{1}{2}x+1 + \tfrac{1}{2}x+1 + \tfrac{1}{4}x + \tfrac{1}{2}$$

$\therefore \tfrac{9}{4}x = \tfrac{2}{4}x + \tfrac{2}{4}x + \tfrac{1}{4}x + \tfrac{2}{2} + \tfrac{2}{2} + \tfrac{1}{2}$

$\therefore \tfrac{9}{4}x = \tfrac{5}{4}x + \tfrac{5}{2}$

$\therefore \tfrac{4}{1}\left(\tfrac{9}{4}x\right) = \tfrac{4}{1}\left(\tfrac{5}{4}x\right) + \tfrac{4}{1}\left(\tfrac{5}{2}\right)$

$\therefore 9x = 5x + 10$

$\therefore 9x - 5x = 5x + 10 - 5x$

$\therefore 4x = 10$

$\therefore \dfrac{4x}{4} = \dfrac{10 \div 2}{4 \div 2}$

$\therefore x = \tfrac{5}{2} = 2.5$

Equilateral Triangle Side Lengths:

$\tfrac{3}{4}x = \tfrac{3}{4}\left(\tfrac{5}{2}\right) = \tfrac{15}{8}$

Isosceles Triangle Side Lengths:

Equal Sides: $\tfrac{1}{2}x+1 = \tfrac{1}{2}\left(\tfrac{5}{2}\right) + 1 = \tfrac{5}{4} + \tfrac{4}{4} = \tfrac{9}{4}$

Third Side: $\tfrac{1}{4}x + \tfrac{1}{2} = \tfrac{1}{4}\left(\tfrac{5}{2}\right) + \tfrac{1}{2} = \tfrac{5}{8} + \tfrac{4}{8} = \tfrac{9}{8}$