Translating and Solving Word Problems.

(1) Declare your variables, (2) write an equation and (3) solve the problem.

1. The sum of three consecutive odd integers is 87. Find the integers.

odd integers

First:	$2n + 1 = 27$	First + Second + Third = 87
Second:	$2n + 3 = 29$	$6n + 9 = 87$
Third:	$2n + 5 = 31$	$6n = 87 - 9$
		$6n = 78$
		$n = 13$

2. The sum of four consecutive even integers is 68. Find the integers.

even integers

First:	$2n = 14$	First + Second + Third + Fourth = 68
Second:	$2n + 2 = 16$	$8n + 12 = 68$
Third:	$2n + 4 = 18$	$8n = 68 - 12$
Fourth:	$2n + 6 = 20$	$8n = 56$
		$n = 7$

3. The sum of three consecutive integers is 138. Find the integers.

consecutive integers

First:	$x = 45$	First + Second + Third = 138
Second:	$x + 1 = 46$	$3x + 3 = 138$
Third:	$x + 2 = 47$	$3x = 138 - 3$
		$3x = 135$
		$x = 45$

4. The sum of two numbers is 22. Twice the smaller increased by the larger is 30. Find the integers.

One:	$x = 8$	2 [one] + Another = 30
Another: $\frac{22 - x}{22}$	$= 14$	$2x + 22 - x = 30$
		$x + 22 = 30$
		$x = 30 - 22$
		$x = 8$

* For **sum** problems, students decide which terms are larger and smaller

5. The difference of two numbers is 5. Three times the smaller minus the larger is 29. (Don't forget to distribute the negative)

One:	$x + 5 = 22$	3 [Another] – One = 29
Another: $\frac{x}{5}$	$= 17$	$3x - (x + 5) = 29$
		$3x - x - 5 = 29$
		$2x - 5 = 29$
		$2x = 29 + 5$
		$2x = 34$
		$x = 17$

* For **difference** problems the larger and smaller are inherently defined

6. A number increased by three times the sum of 5 and the number is equal to one more than six times that number. Find the number.

Number: R = 7

$R + 3(5 + R) = 6R + 1$

$R + 15 + 3R = 6R + 1$

$4R + 15 = 6R + 1$: Move 4R & 1

$15 - 1 = 6R - 4R$

$14 = 2R$

$7 = R$

7. Moe has an average of 75 after 3 tests what would he have to earn on the next test if he wants to have a 78 in the class.

Next Test: E = 87

$$\frac{75 + 75 + 75 + x}{4} = 78$$

$225 + x = 78(4)$

$225 + x = 312$

$x = 312 - 225$

$x = 87$

8. The sum of two numbers is 71. The smaller number minus the larger number is equal to negative twenty five. Find the integers.

One: x = 23

Another: 71 – x = 48

71

[one] – [Another] = –25

$x - (71 - x) = -25$

$x - 71 + x = -25$

$2x - 71 = -25$

$2x = -25 + 71$

$2x = 46$

$x = 23$

* For **sum** problems, students decide which terms are larger and smaller

9.

$$\frac{2r - 3}{-7} = 5$$

$$-7 \bullet \left[\frac{2r - 3}{-7} = 5\right]$$

$2r - 3 = -35$

$2r = -35 + 3$

$2r = -32$

$r = -16$

10.

$$5(8-2n)=4n-2$$
$$40-10n=4n-2$$
$$40+2=4n+10n$$
$$42=14n$$
$$\frac{42}{14}=\frac{14n}{14}$$
$$3=n$$

11.

$$3(2w+4)-3=3-5(w-3)+3w$$
$$6w+12-3=3-5w+15+3w$$
$$6w+9=18-2w$$
$$6w+2w=18-9$$
$$8w=9$$
$$\frac{8w}{8}=\frac{9}{8}$$
$$w=1\frac{1}{8}$$

12.

$$\frac{3k-(-7)}{2}=\frac{2k+(-3)}{4}-\frac{4k+3}{5}$$
$$20\cdot\left[\frac{3k+7}{2}=\frac{2k-3}{4}-\frac{4k+3}{5}\right]$$
$$10(3k+7)=5(2k-3)-4(4k+3)$$
$$30k+70=10k-15-16k-12$$
$$30k+70=-6k-27$$
$$30k+6k=-27-70$$
$$36k=-97$$
$$k=\frac{-97}{36}=-2\frac{25}{36}$$

$$\frac{11m-2}{6}-\frac{3m+(-5)}{2}=\frac{6m-3}{3}$$

$$6\cdot\left[\frac{11m-2}{6}-\frac{3m+(-5)}{2}=\frac{6m-3}{3}\right]$$

$$11m-2-3(3m-5)=2(6m-3)$$

$$11m-2-9m+15=12m-6$$

13.

$$2m+13=12m-6$$

$$13+6=12m-2m$$

$$19=10m$$

$$\frac{19}{10}=\frac{10m}{10}$$

$$1\frac{9}{10}=m$$

14. Three times the difference, of five times a number and nine, is four less than, seven times the number.

$$3(5d-9)=7d-4$$

$$15d-27=7d-4$$

$$15d-7d=-4+27$$

Number: d

$$8d=23$$

$$\frac{8d}{8}=\frac{23}{8}$$

$$d=2\frac{7}{8}$$

15. Two thirds the sum, of seven times a number and three, decreased by one half, is the same as three fourths, the difference, of four times a number and five, increased by one third.

$$\frac{2}{3}(7z+3)-\frac{1}{2}=\frac{3}{4}(4z-5)+\frac{1}{3}$$

$$12\cdot\left[\frac{2}{3}(7z+3)-\frac{1}{2}=\frac{3}{4}(4z-5)+\frac{1}{3}\right]$$

$$8(7z+3)-6=9(4z-5)+4$$

$$56z+24-6=36z-45+4$$

Number: z

$$56z+18=36z-41$$

$$56z-36z=-41-18$$

$$20z=-59$$

$$\frac{20z}{20}=\frac{-59}{20}$$

$$z=-2\frac{19}{20}$$