Translating Phrases into Algebra – Solutions

1. let x = the number, then the expression is $x+3$

2. let x = the number, then the expression is $2x-5$

3. let t = total, then the total plus tip = $t+0.015t=1.15t$

4. $10d$

5. $0.25q$

6. $0.06d$

7. total (including tax) = original + tax = $d+0.06d=1.06d$

8. $12D$

9. let x = 1st integer, then $x+1$ = the 2nd integer and the expression is $x(x+1)$

10. let x = 1st odd integer, then $x+2$ = the 2nd and $x+4$ = the 3rd, so the sum is
$x+(x+2)+(x+4)=3x+6$

11. sale price = original – discount = $p-0.35p=0.65p$

12. $l=2w+2$

13. Let l = length, then using the perimeter formula $P=2l+2w$, we get the expression:
$26=2l+2\cdot 8 \quad \Rightarrow \quad 26=2l+16$

14. Let w = width, then the length = $w-3$. Again using the perimeter formula $P=2l+2w$,
$30=2(w-3)+2w \quad \Rightarrow \quad 30=2w-6+2w \quad \Rightarrow \quad 30=4w-6$

15. Let x = 1st integer, then $x+1$ = 2nd and $x+2$ = 3rd. The sum is then
$x+(x+1)+(x+2)=18 \quad \Rightarrow \quad 3x+3=18$

16. Since the sum is 10, the second number must be $10-x$.

17. Since they must add up to \$10,000, the second person must have $10{,}000-x$ dollars.

18. Since the total length is 15 feet, the second piece must be $15-x$ feet long.

19. Since the number of women is given to us in terms of the number of men, we should use the number of men as our variable: **let *m* = number of men**. Since there are 13 more women than men, the **number of women = *m* + 13**. The rough equation is:

number of men + number of women = total

$m + (m+13) = 165 \Rightarrow 2m+13=165$

20. Since the pieces are in terms of the shorter pieces, we should let the length of the shorter piece be our variable: **let *x* = length of the shorter piece**. Then **the length of the longest piece = 3*x*** and **the length of the middle-sized piece = *x* + 26**. The rough equation is:

length of the shortest + length of the middle + length of the longest = total length

$x + (x+26) + 3x - 6 = 130 \Rightarrow 5x+20=130$

21. Using the perimeter formula $P = 2l + 2w$, we substitute and get:
$96 = 2l + 2 \cdot 12 \Rightarrow 96 = 2l + 24$

22. Let x = percent discount. In general, sale price = original – discount, so:
$175.50 = 225 - x \cdot 225$

23. Let c = cost of the most expensive item we can buy. In general, total (with tax) = cost + tax:
$50 = c + 0.065c \Rightarrow 50 = 1.065c$

24. Let x = bill for food without tax. In general, total (with tax) = cost + tax:
$91.80 = x + 0.08x \Rightarrow 91.80 = 1.08x$

25. Let m = number of minutes for the plans to be equal. Since we want to know when the two plans are equal, the rough equation is:

cost of one plan = cost of the other plan

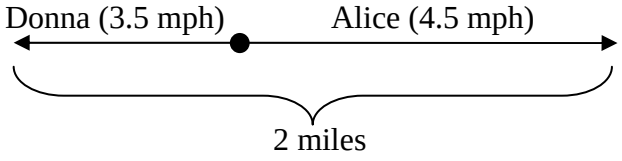
$29.95 = 3.95 + 0.07m$

26. This problem is very similar to the previous. Let x = number of daily rides. The rough equation is then:

cost of one plan = cost of the other plan

$132.30 = 4.90x$

27. Let t = time for them to be out of range. A quick sketch of the situation might look like:



Since this is a distance problem, we set up a table:

	rate	x	time	=	distance
Donna	3.5		t		$3.5t$
Alice	4.5		t		$4.5t$

We know from the drawing that the total distance traveled must be 2 miles, so the equation is: $3.5t + 4.5t = 2 \quad \Rightarrow \quad 8t = 2$

28. We have two unknowns in this problem – the number of hours worked at each job – but we can only have one variable. Since we are not given any information relating the hours worked at one in terms of the other, we can pick either to be our variable.
Let h = number of hours worked at \$7/hr

pay at \$7/hr + pay at \$7.75/hr = total pay

$7h + 7.75(26 - h) = 190.25$

29. Looking at the problem, we can see that this is a *mixture* problem, so follow that strategy. The unknown here is the number of quarts of low-fat milk, so
let x = number of quarts of low-fat (1.5%)

1.5% milk + whole milk (5%) = 2% milk

x	400	$400 + x$
1.5%	5%	2%
$0.015x$	$0.05(400)$	$0.02(400 + x)$

So the equation is: $0.015x + 0.05(400) = 0.02(400 + x)$

30. Though it may not look like it, this is also a mixture problem. The unknown is:
x = number of pounds of coffee worth \$7 a pound

coffee at \$7/lb + 14 lbs at \$4/lb = mixture at \$5/lb

x	14	$14 + x$
\$7	\$4	\$5
$7x$	$(4)(14)$	$5(14 + x)$

$7x + 4 \cdot 14 = 5(14 + x)$