

$$\text{average} = \frac{\text{total}}{\text{number}} \quad \text{total} = \text{average} \times \text{number}$$

1. The average of a sequence of numbers is the middle number. So the average of 21, 22, 23, 24, 25, 26, 27, 28, 29 is the middle number, or  $\boxed{25}$

2. Here we have an even sequence of numbers that are increasing +7 each time. The average is the middle number. The middle numbers are 24 and 31. So the average of the whole sequence is the average of the middle numbers. Average =  $\frac{24+31}{2} = \frac{55}{2} = \boxed{27\frac{1}{2}}$

3. The first 22 counting numbers are 1, 2, 3, 4, . . . , 20, 21, 22. We have a sequence of numbers, so we find the middle number. The middle numbers are 11 and 12, so we find the average of the two middle numbers:  $\frac{11+12}{2} = \frac{23}{2} = \boxed{11\frac{1}{2}}$

4. This string of numbers is NOT a sequence, because sometimes it increases by 1, sometimes it stays the same. So we need to add these numbers and divide by how many there are. The trick is to find pairs of 10:

Rearrange 1, 2, 2, 3, 3, 3, 4, 4, 4, 4, 5, 5, 5, 5, 5, 6, 6, 6, 6, 7, 7, 7, 8, 8, 9 so that 1 is with 9, 2 is with 8, and so on. Now we have pairs of numbers that add up to 10:

$$(1 + 9) + (2 + 8) + (2 + 8) + (3 + 7) + (3 + 7) + (3 + 7) + (4 + 6) + (4 + 6) + (4 + 6) + (4 + 6) + (5 + 5) + (5 + 5) + 5$$

We have 12 10's and 5, and the sum of 12 10's + 5 is 125. There are 25 numbers, so the average is  $\frac{125}{25} = \boxed{5}$

5.  $\frac{96 + 92 + 91}{3} = \boxed{93}$

6. Consider the formulas at the top of the page. We are given the average weight of 3 boxes is 20 pounds. So we will use the second equation to find the total weight of the boxes:

$\text{total} = \text{average} \times \text{number} = 20 \times 3 = 60$ . So the three boxes altogether weight 60 pounds. Now consider the two boxes whose average is 15 pounds. Let's find the total weight of those two boxes, again using the second formula:

$\text{total} = \text{average} \times \text{number} = 15 \times 2 = 30$ . So two boxes together weight 30. Now we know the three boxes weigh 60 altogether, and two of those boxes weigh 30 altogether, so the last box must weigh  $60 - 30 = \boxed{30}$

7. Let's find the total number of trees the students planted.

$\text{total} = \text{average} \times \text{number} = 3.5 \times 10 = 35$ . So between all 10 students, they planted a total of 35 trees. We are given that two planted two trees each ( $2 \times 2 = 4$  trees), three planted three trees each ( $3 \times 3 = 9$  trees), and four planted four trees each ( $4 \times 4 = 16$ ). So far, these 9 students have planted a total of  $4 + 9 + 16 = 29$ . So if all 10 planted 35 together, but 9 planted 26 together, the last student planted  $35 - 29 = \boxed{6}$

8. Let's go piece by piece:

*Albert sold 80 coconuts. Albert = 80.*

*Brandon sold twice as many coconuts as Albert. Brandon =  $2 \times \text{Albert} = 2 \times 80 = 160$ .*

Calvin sold 3 more coconuts than the sum of the coconuts Albert and Brandon sold. Calvin = 3 + Albert + Brandon = 3 + 80 + 160 = 243.

Now we will average them:  $\frac{80 + 160 + 243}{3} = \frac{483}{3} = \boxed{161}$

9. Let  $s$  be the score of the sixth student. Then we can write the average like this:

$$\text{average} = \frac{98 + 86 + 89 + 78 + 95 + s}{6} = \frac{446 + s}{6}.$$

We are given that the sixth score is 4 more than the average, so we can replace  $s$  in the equation with  $\text{average} + 4$ :

$$\text{average} = \frac{446 + (\text{average} + 4)}{6} = \frac{450 + \text{average}}{6}.$$

Now let's use the second equation from the top of the page. Here,  $\text{total} = 450 + \text{average}$  and  $\text{number} = 6$ .

$\text{total} = \text{average} \times \text{number} \Rightarrow 450 + \text{average} = \text{average} \times 6$ . Now we can use guess and check to find a number to replace with "average" to make this true. When  $\text{average} = 90$ , we get  $450 + 90 = 540$ , and  $90 \times 6 = 540$ . So then the average must be  $\boxed{90}$

10. When we work with percentages, we must convert them to decimals. To do that, we just move the decimal place 2 spaces to the left. So 22% becomes .22, 47.6% becomes .476. To turn a decimal into a percent, move the decimal two places to the right. So .34 becomes 34%, and .9234 becomes 92.34%.

First, let's find the total score of the 38 students who were present for the exam.  $\text{total} = \text{average} \times \text{number} = .89 \times 38 = 33.82$ . So the total percentage that the 38 students earned together is 33.82.

Now we need to find the average score for the whole class. To find the average, we need to add up all of the scores (the total score of the 38 students and the scores of the 2 absent students) and divide by the size of the whole class, or 40. So  $\text{average} = \frac{\text{total}}{\text{number}} = \frac{33.82 + .99 + .99}{40} = \frac{35.8}{40} = .895$ . Now we must turn this back into a decimal, so we move the decimal two places to the right, and we get  $\boxed{89.5\%}$