~~6-A2~~   **Problem Solving Using Inequalities**   Alg 1H

Solve by using a variable to write an inequality based on the given information.
**All work must be shown neatly on notebook paper.**

1.   The sum of two consecutive integers is less than 75. Find the pair of integers with
the greatest sum.

Let $x$ = the first integer          $x + x + 1 < 75$
Let $x+1$ = the second integer      $2x + 1 < 75$
                                    $2x < 74$     ☐ 36 and 37 ☐
                                    $x < 37$

2.   Of all the pairs of consecutive odd integers whose sum is greater than 80, find the
pair whose sum is least.

Let $x$ = the first odd integer      $x + x + 2 > 80$
Let $x+2$ = " second " "            $2x + 2 > 80$
                                    $2x > 78$     ☐ 41 and 43 ☐
                                    $x > 39$

3.   A bag contains 100 marbles, some red, and the rest blue.  If there are no more
than one and one-half times as many red marbles as blue ones in the bag, At most
how many red marbles are in the bag?      $r \le 1.5\ b$

Let $r$ = # of red marbles          $r \le 1.5(100 - r)$
Let $100 - r$ = # of blue marbles   $r \le 150 - 1.5r$
                                    $2.5r \le 150$     ☐ 60 red marbles ☐
                                    $r \le 60$

4.   Two sides of a triangle have the same length.  The third is 20 cm longer than each
of the other sides.  The perimeter is no less than 95 cm.  At least how     long
are the sides of the triangle?

Let $x$ = length of 2-sides          $2x + x + 20 \ge 95$
Let $x+20$ = length of $3^{RD}$ side  $3x + 20 \ge 95$
                                    $3x \ge 75$     ☐ At least 25, 25,
                                    $x \ge 25$          and 45 cm ☐

5.   There are 3 exams in a marking period.  A student received grades of 74 and 83
on the first two exams.  What grade must the student get on the last exam to
obtain an average for the marking period of no less than 80?

Let $x$ = score on last exam         $\dfrac{74 + 83 + x}{3} \ge 80$
                                    $157 + x \ge 240$     ☐ at least 83 ☐
                                    $x \ge 83$

6. If Kelly were able to increase her average cycling speed by 3.5 km/h, she would be able to cover in 2 hours a distance at least as great as that which now takes her 3 hours. What is the best average speed she achieves at present?

Let $n$ = present average speed
Let $n+3.5$ = increased speed

new distance ≥ old distance

$2(n+3.5) \geq 3n$
$2n + 7 \geq 3n$
$7 \geq n$
$n \leq 7$

$\boxed{7 \text{ km/h}}$

7. Margaret set her car's odometer at zero at the start of her trip home. When the odometer showed that she had driven 16 miles a highway sign showed her that she was still more than 25 miles from her home. What is the minimum total distance to the nearest mile that she will have traveled when she arrives home?

Let $x$ = total distance

$x - 16 > 25$
$x > 41$

$\boxed{42 \text{ miles}}$

8. A coin bank containing only quarters, dimes, and nickels has twice as many dimes as nickels and half as many quarters as nickels. In all, the bank contains no more than $11.40. At most, how many nickels must be in the coin bank?

Let $n$ = number of nickels
Let $2n$ =   "    "  dimes
Let $\frac{1}{2}n$ =   "    "  quarters

$5n + 10(2n) + 25(\frac{1}{2}n) \leq 1140$
$5n + 20n + 12.5n \leq 1140$
$37.5n \leq 1140$
$n \leq 30.4$

$\boxed{30 \text{ nickels}}$

9. The width of a rectangular computer screen is 20 cm less than twice the length. The perimeter is more than 56 cm. Find the minimum dimensions of the screen if each dimension, in centimeters, is an integer.

Let $l$ = the length
Let $2l - 20$ = the width

$2(l) + 2(2l - 20) > 56$
$2l + 4l - 40 > 56$
$6l - 40 > 56$
$6l > 96$
$l > 16$

$2(17) - 20$
$34 - 20$
$14$

$\boxed{\text{length: } 17 \text{ cm} \\ \text{width : } 14 \text{ cm}}$

10. A worker is paid $9 an hour but 30% of his salary is deducted for taxes, social security and insurance. What whole number of hours must he work to have at least $250 take home pay?

Let $h$ = # of hours

$9h - .30(9h) \geq 250$
$9h - 2.7h \geq 250$
$6.3h \geq 250$
$h \geq 39.6$

$\boxed{40 \text{ hours}}$