**Name:**____________________________________

# 1. ALGEBRAIC INEQUALITIES

Algebraic inequality statements are solved in the same manner as equations. However, do not forget that whenever you multiply or divide by a negative number, the order of the inequality, that is, the inequality symbol must be reversed. In reading the inequality symbol, remember that it points to the smaller quantity. $a < b$ is read $a$ is less than $b$. $a > b$ is read $a$ is greater than $b$.

***Example:***

Solve for $x$: $12 - 4x < 8$

***Solution:***

Add –12 to each side.
$-4x < -4$
Divide by –4, remembering to reverse the inequality sign.
$x > 1$

***Example:***

$6x + 5 > 7x + 10$

***Solution:***

Collect all the terms containing $x$ on the left side of the equation and all numerical terms on the right. As with equations, remember that if a term comes from one side of the inequality to the other, that term changes sign.
$-x > 5$
Divide (or multiply) by –1.
$x < -5$

## *Exercise 1*

Work out each problem. Circle the letter that appears before your answer.

1. Solve for $x$: $8x < 5(2x + 4)$
   (A) $x > -10$
   (B) $x < -10$
   (C) $x > 10$
   (D) $x < 10$
   (E) $x < 18$

2. Solve for $x$: $6x + 2 - 8x < 14$
   (A) $x = 6$
   (B) $x = -6$
   (C) $x > -6$
   (D) $x < -6$
   (E) $x > 6$

3. A number increased by 10 is greater than 50. What numbers satisfy this condition?
   (A) $x > 60$
   (B) $x < 60$
   (C) $x > -40$
   (D) $x < 40$
   (E) $x > 40$

4. Solve for $x$: $-.4x < 4$
   (A) $x > -10$
   (B) $x > 10$
   (C) $x < 8$
   (D) $x < -10$
   (E) $x < 36$

5. Solve for $x$: $.03n > -.18$
   (A) $n < -.6$
   (B) $n > .6$
   (C) $n > 6$
   (D) $n > -6$
   (E) $n < -6$

6. Solve for $b$: $15b < 10$
   (A) $b < \frac{3}{2}$
   (B) $b > \frac{3}{2}$
   (C) $b < -\frac{3}{2}$
   (D) $b < \frac{2}{3}$
   (E) $b > \frac{2}{3}$

7. If $x^2 < 4$, then
   (A) $x > 2$
   (B) $x < 2$
   (C) $x > -2$
   (D) $-2 < x < 2$
   (E) $-2 \le x \le 2$

8. Solve for $n$: $n + 4.3 < 2.7$
   (A) $n > 1.6$
   (B) $n > -1.6$
   (C) $n < 1.6$
   (D) $n < -1.6$
   (E) $n = 1.6$

9. If $x < 0$ and $y < 0$, which of the following is always true?
   (A) $x + y > 0$
   (B) $xy < 0$
   (C) $x - y > 0$
   (D) $x + y < 0$
   (E) $x = y$

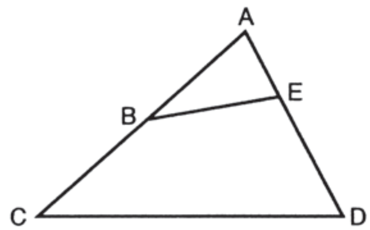
10. If $x < 0$ and $y > 0$, which of the following will always be greater than 0?
    (A) $x + y$
    (B) $x - y$
    (C) $\frac{x}{y}$
    (D) $xy$
    (E) $-2x$

# 2. GEOMETRIC INEQUALITIES

In working with geometric inequalities, certain postulates and theorems should be reviewed.

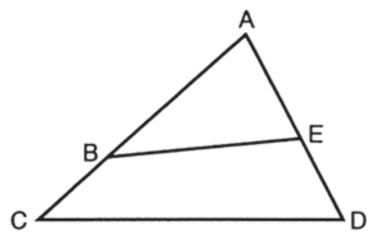
**A. If unequal quantities are added to unequal quantities of the same order, the sums are unequal in the same order.**

If $AB > AE$ and
(+) $BC > ED$ then
$AC > AD$



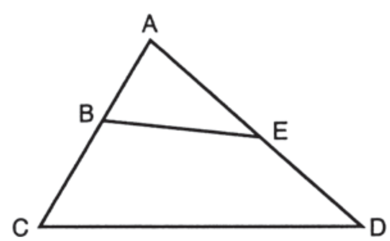

**B. If equal quantities are added to unequal quantities, the sums are unequal in the same order.**

$AB > AE$ and
(+) $BC = ED$ then
$AC > AD$



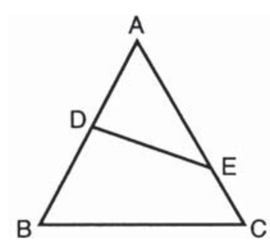

**C. If equal quantities are subtracted from unequal quantities, the differences are unequal in the same order.**

If $AC > AD$ and
(−) $BC = ED$ then
$AB > AE$




**D. If unequal quantities are subtracted from equal quantities, the results are unequal in the *opposite* order.**

$AB = AC$
(−) $AD < AE$
$DB > EC$

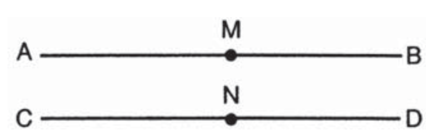



**E. Doubles of unequals are unequal in the same order.**

$M$ is the midpoint of $AB$

$N$ is the midpoint of $CD$

$AM > CN$
Therefore, $AB > CD$



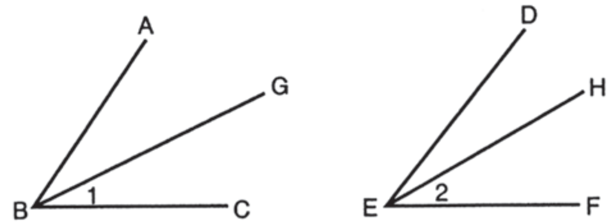
**F. Halves of unequals are unequal in the same order.**

$\angle ABC > \angle DEF$

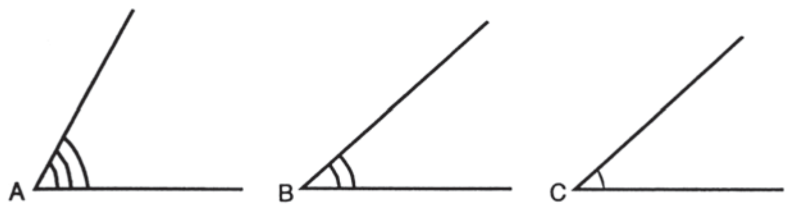
$\overline{BG}$ bisects $\angle ABC$

$\overline{EH}$ bisects $\angle DEF$

Therefore, $\angle 1 > \angle 2$



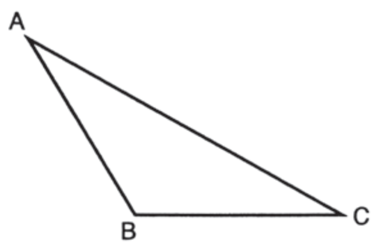

**G. If the first of three quantities is greater than the second, and the second is greater than the third, then the first is greater than the third.**




If $\angle A > \angle B$ and $\angle B > \angle C$, then $\angle A > \angle C$.

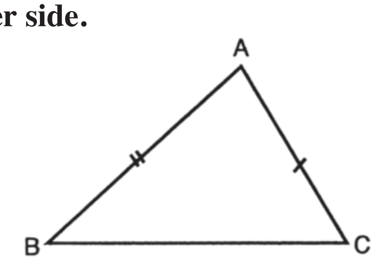
**H. The sum of two sides of a triangle must be greater than the third side.**

AB + BC > AC



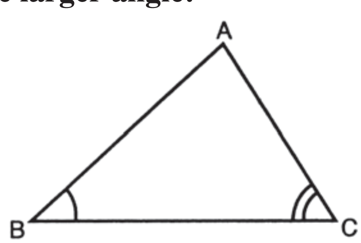

**I. If two sides of a triangle are unequal, the angles opposite are unequal, with the larger angle opposite the larger side.**

If $AB > AC$, then $\angle C > \angle B$.



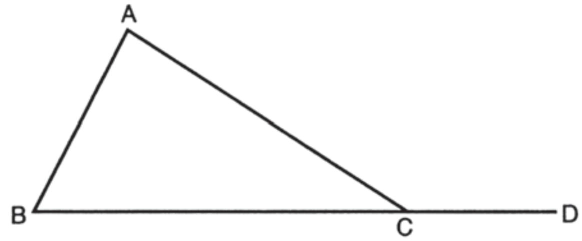

**J. If two angles of a triangle are unequal, the sides opposite these angles are unequal, with the larger side opposite the larger angle.**

If $\angle C > \angle B$, then AB > AC.



**K. An exterior angle of a triangle is greater than either remote interior angle.**

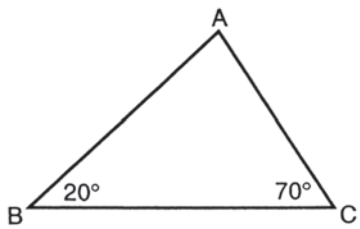
$\angle ACD > \angle B$ and $\angle ACD > \angle A$




## *Exercise 2*

Work out each problem. Circle the letter that appears before your answer.

1. Which of the following statements is true regarding triangle *ABC?*

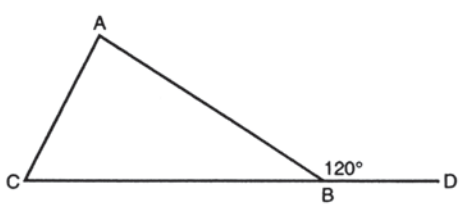



(A) $AC > AB$
(B) $AB > BC$
(C) $AC > BC$
(D) $BC > AB$
(E) $BC > AB + AC$

2. In triangle *RST*, $RS = ST$. If *P* is any point on *RS*, which of the following statements is always true?

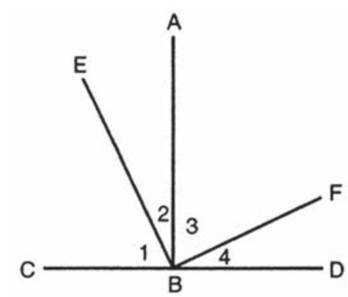
(A) $PT < PR$
(B) $PT > PR$
(C) $PT = PR$
(D) $PT = \frac{1}{2} PR$
(E) $PT \leq PR$

3. If $\angle A > \angle C$ and $\angle ABD = 120°$, then




(A) $AC < AB$
(B) $BC < AB$
(C) $\angle C > \angle ABC$
(D) $BC > AC$
(E) $\angle ABC > \angle A$

4. If $AB \perp CD$ and $\angle 1 > \angle 4$, then




(A) $\angle 1 > \angle 2$
(B) $\angle 4 > \angle 3$
(C) $\angle 2 > \angle 3$
(D) $\angle 2 < \angle 3$
(E) $\angle 2 < \angle 4$

5. Which of the following sets of numbers could be the sides of a triangle?

(A) 1, 2, 3
(B) 2, 2, 4
(C) 3, 3, 6
(D) 1, 1.5, 2
(E) 5, 6, 12