Inequalities in One Triangle

Total points = 107

A.

1. $\overline{BC} < \overline{AC} < \overline{AB}$ ✓
   $\therefore \angle A < \angle B < \angle C$ ✓
2. $\overline{DF} < \overline{EF} < \overline{DE}$ ✓
   $\therefore \angle E < \angle D < \angle F$ ✓

B.

1. $m\angle A + m\angle B + m\angle C = 180°$ ✓
   $40° + 89° + m\angle C = 180°$ ✓
   $129° + m\angle C = 180°$ ✓
   $m\angle C = 180° - 129°$ ✓
   $m\angle C = \boxed{51°}$ ✓
   $\angle A < \angle C < \angle B$ ✓
   $\therefore \overline{BC} < \overline{AB} < \overline{AC}$ ✓
2. $m\angle P + m\angle V + m\angle C = 180°$ ✓
   $117° + 27° + m\angle C = 180°$ ✓
   $144° + m\angle C = 180°$ ✓
   $m\angle C = 180° - 144°$ ✓
   $m\angle C = \boxed{36°}$ ✓
   $\angle V < \angle C < \angle P$ ✓
   $\therefore \overline{CP} < \overline{PV} < \overline{CV}$ ✓
3. $m\angle B + m\angle P + m\angle F = 180°$ ✓
   $38° + 92° + m\angle F = 180°$ ✓
   $130° + m\angle F = 180°$ ✓
   $m\angle F = 180° - 130°$ ✓
   $m\angle F = \boxed{50°}$ ✓
   $\angle B < \angle F < \angle P$ ✓
   $\therefore \overline{FP} < \overline{BP} < \overline{BF}$ ✓

C.

1. $6 + 17 > 12$ ✓
   $23 > 12$ ✓
   True ✓
   $17 + 12 > 6$ ✓
   $29 > 6$ ✓
   True ✓
   $6 + 12 > 17$ ✓
   $18 > 17$ ✓
   True ✓
   $\therefore$ Yes ✓
2. $14 + 33 > 19$ ✓
   $47 > 19$ ✓
   True ✓
   $14 + 19 > 33$ ✓
   $33 > 33$ ✓
   False ✓
   $33 + 19 > 14$ ✓
   $52 > 14$ ✓
   True ✓
   $\therefore$ No ✓
3. $3.7 + 5.2 > 8.5$ ✓
   $8.9 > 8.5$ ✓
   True ✓
   $5.2 + 8.5 > 3.7$ ✓
   $13.7 > 3.7$ ✓
   True ✓
   $3.7 + 8.5 > 5.2$ ✓
   $12.2 > 5.2$ ✓
   True ✓
   $\therefore$ Yes ✓

D.

1. $a + b > c$ ✓
   $5 + 12 > c$ ✓
   $\boxed{17 > c}$ ✓
   $b + c > a$ ✓
   $12 + c > 5$ ✓
   $c > 5 - 12$ ✓
   $\boxed{c > -7}$ ✓
   $a + c > b$ ✓
   $5 + c > 12$ ✓
   $c > 12 - 5$ ✓
   $\boxed{c > 7}$ ✓
   $\therefore 7 < c < 17$ ✓
2. $a + b > c$ ✓
   $17.4 + 28.1 > c$ ✓
   $\boxed{45.5 > c}$ ✓
   $b + c > a$ ✓
   $28.1 + c > 17.4$ ✓
   $c > 17.4 - 28.1$ ✓
   $\boxed{c > -10.7}$ ✓
   $a + c > b$ ✓
   $17.4 + c > 28.1$ ✓
   $c > 28.1 - 17.4$ ✓
   $\boxed{c > 10.7}$ ✓
   $\therefore 10.7 < c < 45.5$ ✓
3. $a + b > c$ ✓
   $7\frac{1}{4} + b > 3\frac{1}{2}$ ✓
   $b > 3\frac{1}{2} - 7\frac{1}{4}$ ✓
   $\boxed{b > -3\frac{3}{4}}$ ✓
   $b + c > a$ ✓
   $b + 3\frac{1}{2} > 7\frac{1}{4}$ ✓
   $b > 7\frac{1}{4} - 3\frac{1}{2}$ ✓
   $\boxed{b > 3\frac{3}{4}}$ ✓
   $a + c > b$ ✓
   $7\frac{1}{4} + 3\frac{1}{2} > b$ ✓
   $\boxed{10\frac{3}{4} > b}$ ✓
   $\therefore 3\frac{3}{4} < b < 10\frac{3}{4}$ ✓

E.

1. $m\angle 4 = m\angle 1 + m\angle 2$ ✓
   $m\angle 4 = 57° + 54°$ ✓
   $m\angle 4 = \boxed{111°}$ ✓
2. $m\angle 4 = m\angle 1 + m\angle 2$ ✓
   $150° = m\angle 1 + 37°$ ✓
   $150° - 37° = m\angle 1$ ✓
   $m\angle 1 = \boxed{113°}$ ✓
3. $m\angle 4 = m\angle 1 + m\angle 2$ ✓
   $(6x - 4)° = (2x + 7)° + (x + 31)°$ ✓
   $6x - 4 = 3x + 38$ ✓
   $6x - 3x = 38 + 4$ ✓
   $\frac{3x}{3} = \frac{42}{3}$ ✓
   $\boxed{x = 14°}$ ✓

Inequalities in One Triangle

Total points = 107

A.

1. $\overline{BC} < \overline{AC} < \overline{AB}$ ✓
   $\therefore \angle A < \angle B < \angle C$ ✓
2. $\overline{DF} < \overline{EF} < \overline{DE}$ ✓
   $\therefore \angle E < \angle D < \angle F$ ✓

B.

1. $m\angle A + m\angle B + m\angle C = 180°$ ✓
   $40° + 89° + m\angle C = 180°$ ✓
   $129° + m\angle C = 180°$ ✓
   $m\angle C = 180° - 129°$ ✓
   $m\angle C = \boxed{51°}$ ✓
   $\angle A < \angle C < \angle B$ ✓
   $\therefore \overline{BC} < \overline{AB} < \overline{AC}$ ✓
2. $m\angle P + m\angle V + m\angle C = 180°$ ✓
   $117° + 27° + m\angle C = 180°$ ✓
   $144° + m\angle C = 180°$ ✓
   $m\angle C = 180° - 144°$ ✓
   $m\angle C = \boxed{36°}$ ✓
   $\angle V < \angle C < \angle P$ ✓
   $\therefore \overline{CP} < \overline{PV} < \overline{CV}$ ✓
3. $m\angle B + m\angle P + m\angle F = 180°$ ✓
   $38° + 92° + m\angle F = 180°$ ✓
   $130° + m\angle F = 180°$ ✓
   $m\angle F = 180° - 130°$ ✓
   $m\angle F = \boxed{50°}$ ✓
   $\angle B < \angle F < \angle P$ ✓
   $\therefore \overline{FP} < \overline{BP} < \overline{BF}$ ✓

C.

1. $6 + 17 > 12$ ✓
   $23 > 12$ ✓
   True ✓
   $17 + 12 > 6$ ✓
   $29 > 6$ ✓
   True ✓
   $6 + 12 > 17$ ✓
   $18 > 17$ ✓
   True ✓
   $\therefore$ Yes ✓
2. $14 + 33 > 19$ ✓
   $47 > 19$ ✓
   True ✓
   $14 + 19 > 33$ ✓
   $33 > 33$ ✓
   False ✓
   $33 + 19 > 14$ ✓
   $52 > 14$ ✓
   True ✓
   $\therefore$ No ✓
3. $3.7 + 5.2 > 8.5$ ✓
   $8.9 > 8.5$ ✓
   True ✓
   $5.2 + 8.5 > 3.7$ ✓
   $13.7 > 3.7$ ✓
   True ✓
   $3.7 + 8.5 > 5.2$ ✓
   $12.2 > 5.2$ ✓
   True ✓
   $\therefore$ Yes ✓

D.

1. $a + b > c$ ✓
   $5 + 12 > c$ ✓
   $\boxed{17 > c}$ ✓
   $b + c > a$ ✓
   $12 + c > 5$ ✓
   $c > 5 - 12$ ✓
   $\boxed{c > -7}$ ✓
   $a + c > b$ ✓
   $5 + c > 12$ ✓
   $c > 12 - 5$ ✓
   $\boxed{c > 7}$ ✓
   $\therefore 7 < c < 17$ ✓
2. $a + b > c$ ✓
   $17.4 + 28.1 > c$ ✓
   $\boxed{45.5 > c}$ ✓
   $b + c > a$ ✓
   $28.1 + c > 17.4$ ✓
   $c > 17.4 - 28.1$ ✓
   $\boxed{c > -10.7}$ ✓
   $a + c > b$ ✓
   $17.4 + c > 28.1$ ✓
   $c > 28.1 - 17.4$ ✓
   $\boxed{c > 10.7}$ ✓
   $\therefore 10.7 < c < 45.5$ ✓
3. $a + b > c$ ✓
   $7\frac{1}{4} + b > 3\frac{1}{2}$ ✓
   $b > 3\frac{1}{2} - 7\frac{1}{4}$ ✓
   $\boxed{b > -3\frac{3}{4}}$ ✓
   $b + c > a$ ✓
   $b + 3\frac{1}{2} > 7\frac{1}{4}$ ✓
   $b > 7\frac{1}{4} - 3\frac{1}{2}$ ✓
   $\boxed{b > 3\frac{3}{4}}$ ✓
   $a + c > b$ ✓
   $7\frac{1}{4} + 3\frac{1}{2} > b$ ✓
   $\boxed{10\frac{3}{4} > b}$ ✓
   $\therefore 3\frac{3}{4} < b < 10\frac{3}{4}$ ✓

E.

1. $m\angle 4 = m\angle 1 + m\angle 2$ ✓
   $m\angle 4 = 57° + 54°$ ✓
   $m\angle 4 = \boxed{111°}$ ✓
2. $m\angle 4 = m\angle 1 + m\angle 2$ ✓
   $150° = m\angle 1 + 37°$ ✓
   $150° - 37° = m\angle 1$ ✓
   $m\angle 1 = \boxed{113°}$ ✓
3. $m\angle 4 = m\angle 1 + m\angle 2$ ✓
   $(6x - 4)° = (2x + 7)° + (x + 31)°$ ✓
   $6x - 4 = 3x + 38$ ✓
   $6x - 3x = 38 + 4$ ✓
   $\frac{3x}{3} = \frac{42}{3}$ ✓
   $\boxed{x = 14°}$ ✓