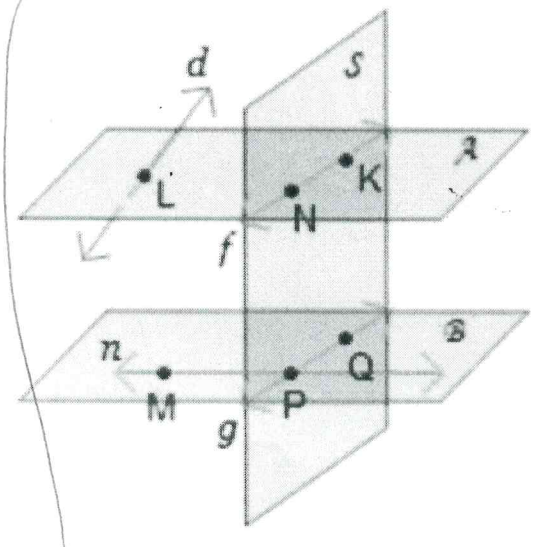
Points, Lines, and Planes



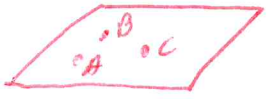
1. Provide another name for Plane A: Plane NKL
2. Name the intersection of Plane A and line d: Point L
3. Provide another name for line f: $\overleftrightarrow{NK}$
4. Name 4 coplanar points: Points N, K, P, Q
5. Name the intersection of Plane S and Plane A: line f or $\overleftrightarrow{NK}$
6. Name the intersection of line n and line g: Point P
7. Name the intersection of Plane B and Plane S: line g or $\overleftrightarrow{PQ}$
8. Name Plane S in two other ways: Plane NKP and Plane NKQ
9. Name 4 points that are non-coplanar: N, K, M, P
10. Name 3 points that are non-collinear: L, N, K
11. Name a point that is in both Plane S and Plane A: Point N
12. Name a point that is not in either Plane A or Plane S: Point M
13. Name a line that is contained in plane A: line f or $\overleftrightarrow{NK}$
14. Name a line that is not contained in Plane A: ~~line~~ line d
15. Name a ray that is contained in Plane A: $\overrightarrow{NK}$
16. Name a ray that is not contained in Plane A: $\overrightarrow{PM}$

What are the two ways to name a plane?
① with the symbol in the corner of the plane
② with 3 non-collinear points that lie in the plane

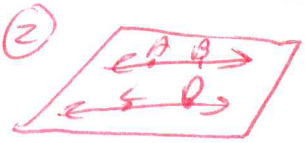
What are the two ways to name a line?
① with the symbol next to the line
② with any two points on the line with the arrows over top.

Sketch each of the following independently:

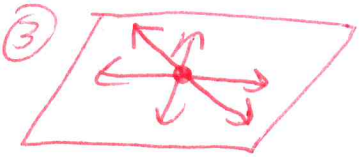
1. Three points that are coplanar but not collinear.



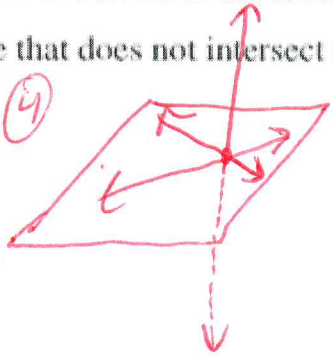
2. Two lines that lie in a plane but do not intersect.



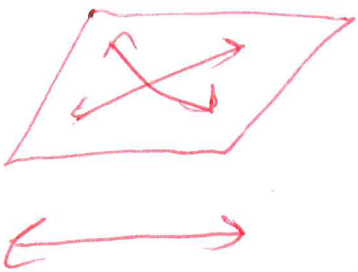
3. Three lines that intersect in a point and all lie in the same plane.



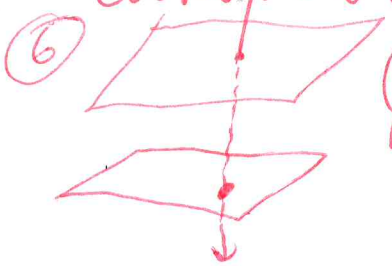
4. Three lines that intersect in a point but do not all lie in the same plane.



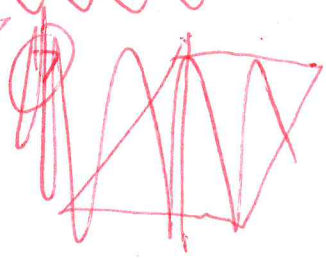
5. Two lines that intersect and another line that does not intersect either one.



6. Two planes that do not intersect.



7. Three planes that intersect in a line.



Segment Addition/Segment bisectors

Find QR.

$\overline{QT} \cong \overline{TR}$

So $QT = TR$

$4x - 10 = 78$

$+10 \quad +10$

$\frac{4x}{4} = \frac{88}{4}$ $x = 22$

$4(22) - 10$

$88 - 10$

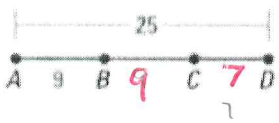
78

$QT + TR = QR$

$78 + 78 = QR$

$156 = QR$

Using Midpoints In the diagram below, B is the midpoint of $\overline{AC}$, $AB = 9$, and $AD = 25$. Find CD.



$\overline{AB} \cong \overline{BC}$

So $BC = 9$ since $AC = 9$

$AB + BC + CD = 25$

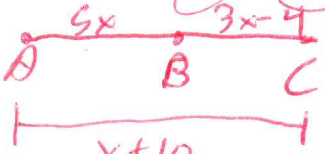
$9 + 9 + CD = 25$

$18 + CD = 25$

$-18 \quad -18$

$CD = 7$

Given B is between A and C. If AC= x + 10, AB = 5x, and BC= 3x - 4 find the values of x and AC.



$5x + 3x - 4 = x + 10$

$8x - 4 = x + 10$

$-x \quad -x$

$7x - 4 = 10$

$+4 \quad +4$

$7x = 14$

$\frac{7x}{7} = \frac{14}{7}$

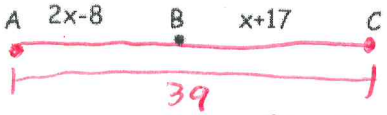
$x = 2$

$AC = x + 10$

$AC = 2 + 10$

$AC = 12$

Given : AC = 39 m



X = 10

AB = 12

BC = 27

$AB = 2x - 8$

$AB = 2(10) - 8$

$AB = 20 - 8$

$AB = 12$

$BC = x + 17$

$BC = 10 + 17$

$BC = 27$

$AB + BC = AC$

$2x - 8 + x + 17 = 39$

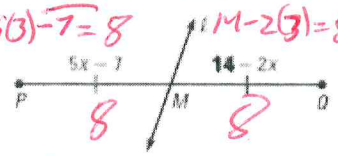
$3x + 9 = 39$

$-9 \quad -9$

$\frac{3x}{3} = \frac{30}{3}$

$x = 10$

Identify the segment bisector of $\overline{PQ}$. Then find PQ.



$\overline{PM} \cong \overline{MQ}$

So $PM = MQ$

$5x - 7 = 14 - 2x$

$+2x \quad +2x$

$7x - 7 = 14$

$+7 \quad +7$

$\frac{7x}{7} = \frac{21}{7}$

$x = 3$

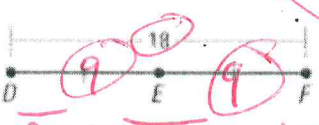
$PQ = 16$

$PM + MQ = PQ$

$8 + 8 = PQ$

$16 = PQ$

Find DE and EF.



$\overline{DE} \cong \overline{EF}$

So $DE = EF$

$9 = 9$

$18/2$

$DE + EF = DF$

$DE + DE = DF$

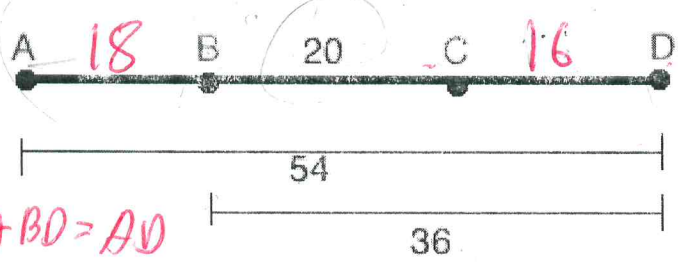
$2DE = DF$

$\frac{2DE}{2} = \frac{18}{2}$

$DE = 9$

Segment Addition Higher Level

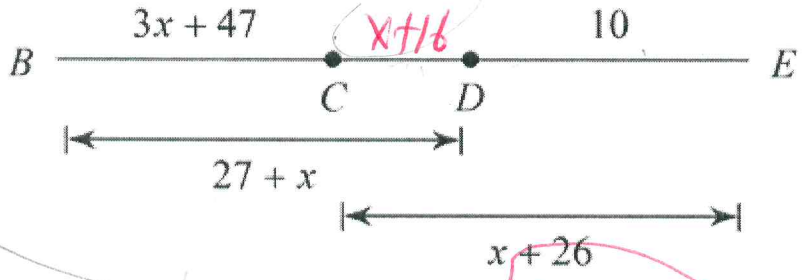
Find AB and CD:



BC+CD = BD
20+CD = 36
-20 -20
CD = 16

AB+BD = AD
AB+36 = 54
-36 -36
AB = 18

Find CE

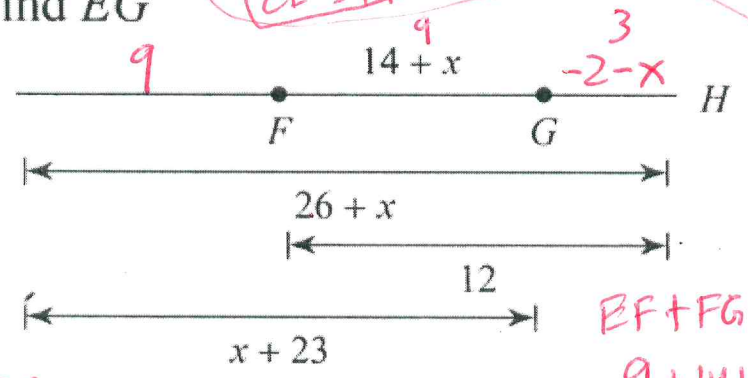


CD+DE = CD
CD+10 = x+26
-10 -10
CD = x+16

BC+CD = BD
3x+47+x+16 = 27+x
4x+63 = 27+x
-x -x
3x+63 = 27
-63 -63
3x = -36
3 3
x = -12

CE = x+26
CE = -12+26
CE = 14

Find EG



EG = 9+14+x
EG = 9+14+(-5)
EG = 18

EF+FG = EG
EF+14+x = x+23
-14-x -x -14
EF = 9

FG+GH = FH
14+x+GH = 12
-14-x -14-x
GH = -2-x

EF+FG+GH = EH
9+14+x+-2-x = 26+x
21 = 26+x
-26 -26
-5 = x

Midpoint/Distance Formulas

Given points A(-4,2) and B(3,3).

1. If C is the midpoint of AB, find point C.
2. Find AB.
3. If B is the midpoint of AD, find point D.

Give the points A(3,-2) and B(-5, 6).

4. Find the midpoint C of the two points.
5. Find AC
6. Find BC
7. If (3, -2) is an endpoints and (-5,6) is a midpoint, find the other endpoint.

*Note 4-7 are using a different points A and B than #1-3.

(1) A(-4,2) B(3,3)

$A(x_1, y_1)$ $B(x_2, y_2)$

$x_m = \frac{x_1+x_2}{2}$ $y_m = \frac{y_1+y_2}{2}$

$x_m = \frac{-4+3}{2}$ $y_m = \frac{2+3}{2}$

$x_m = -\frac{1}{2}$ $y_m = \frac{5}{2}$

$C\left(-\frac{1}{2}, \frac{5}{2}\right)$

(2) A(-4,2) B(3,3)

$AB = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

$AB = \sqrt{(-4-3)^2+(2-3)^2}$

$AB = \sqrt{(-7)^2+(-1)^2}$

$AB = \sqrt{49+1}$

$AB = \sqrt{50}$

(3) A(-4,2) B(3,3) D(x_2, y_2)

$A(x_1, y_1)$ $B(x_m, y_m)$

$x_m = \frac{x_1+x_2}{2}$ $y_m = \frac{y_1+y_2}{2}$

$3 = \frac{-4+x_2}{2}$ $3 = \frac{2+x_2}{2}$

$6 = -4+x_2$ $6 = 2+x_2$

$+4 \quad +4$ $-2 \quad -2$

$10 = x_2$ $4 = y_2$

D(10, 4)

(4) A(3,-2) B(-5,6)

$x_m = \frac{x_1+x_2}{2}$ $y_m = \frac{y_1+y_2}{2}$

$x_m = \frac{3+5}{2}$ $y_m = \frac{-2+6}{2}$

$x_m = \frac{-2}{2}$ $y_m = \frac{4}{2}$

$x_m = -1$ $y_m = 2$

C(-1, 2)

(5) A(3,-2) C(-1,2)

$AC = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

$AC = \sqrt{(3-(-1))^2+(-2-2)^2}$

$AC = \sqrt{(4)^2+(-4)^2}$

$AC = \sqrt{16+16}$

$AC = \sqrt{32}$

(6) B(-5,6) C(-1,2)

$BC = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

$BC = \sqrt{(-5-(-1))^2+(6-2)^2}$

$BC = \sqrt{(-4)^2+4^2}$

$BC = \sqrt{16+16}$

$BC = \sqrt{32}$

(7) (3,-2) (x_m, y_m) (x_2, y_2)

$x_m = \frac{x_1+x_2}{2}$ $y_m = \frac{y_1+y_2}{2}$

$-5 = \frac{3+x_2}{2}$ $6 = \frac{-2+y_2}{2}$

$-10 = 3+x_2$ $12 = -2+y_2$

$-13 = x_2$ $14 = y_2$

(-13, 14)