Name __Key__   Date _____

Vertical Angles

Vertical angles can be thought of as opposite angles. Their sides form two pairs of opposite rays. Vertical angles are the nonadjacent angles formed when two lines intersect.
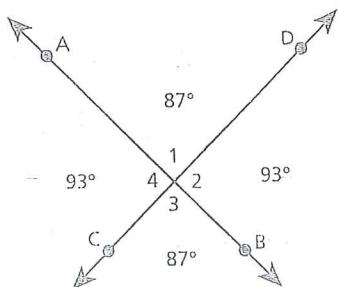
Line AB and line CD intersect.

Angle 1 and angle 3 are vertical angles.
Angle 2 and angle 4 are vertical angles.

Vertical angles are congruent. The angle measure for each vertical angle pair will be the same.
Adjacent angles are supplementary.

$\angle 1 + \angle 2 = 180°$
$\angle 3 + \angle 4 = 180°$

Use vertical angles to determine the missing measures. Name the vertical angle pairs.

①

$m\angle XAY = $ __142°__

$m\angle XAT = $ __38°__
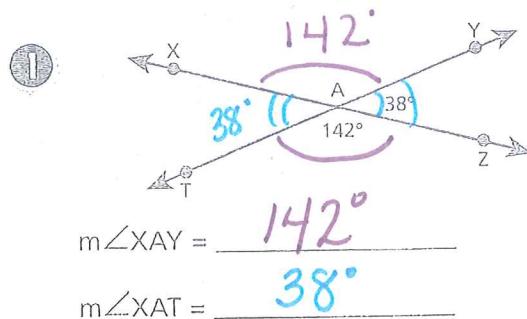
Vertical pairs:

__∠XAT__ and __∠ZAY__

__∠XAY__ and __∠ZAT__

②   180-118 = 62°

$m\angle PQN = $ __118°__

$m\angle JQP = $ __62°__

Vertical pairs:

__∠JQP__ and __∠NQM__

__∠JQM__ and __∠NQP__

③   180-72°

$m\angle JKL = $ __108°__

$m\angle UKJ = $ __72°__

Vertical pairs:

__∠JKL__ and __∠MKU__

__∠UKJ__ and __∠LKM__

④

$m\angle RSF = $ __90°__

$m\angle FSM = $ __90°__
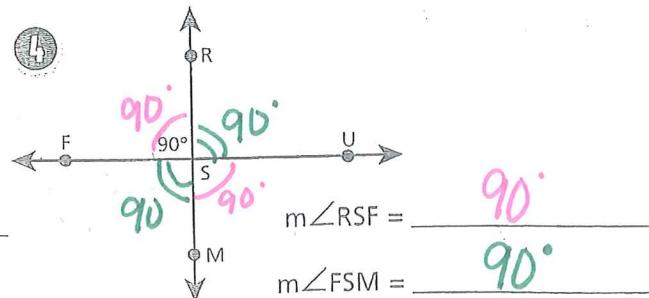
Vertical pairs:

__∠RSF__ and __∠USM__

__∠FSM__ and __∠RSU__

Name _____ Date _____

Find Missing Angle Measurements

Use your understanding of complementary, supplementary, and linear angles to find the missing measures.

∠10 and ∠11 are complementary angles.   **∠10 + ∠11 = 90 def of compl.**

① If m∠10 = 32°, then m∠11 = __58°__   32 + ∠11 = 90°

② If m∠10 = 63°, then m∠11 = __27°__   63 + ∠11 = 90°

③ If m∠10 = 11°, then m∠11 = __79°__   11 + ∠11 = 90

∠14 and ∠15 are supplementary angles.   **∠14 + ∠15 = 180 def of suppl.**

④ If m∠14 = 68°, then m∠15 = __112°__   68 + ∠15 = 180°

⑤ If m∠14 = 111°, then m∠15 = __69°__   111 + ∠15 = 180°

⑥ If m∠14 = 87°, then m∠15 = __93°__   87 + ∠15 = 180°

∠M and ∠P are linear angles.   **∠M + ∠P = 180° linear pairs are suppl.**

⑦ If m∠M = 67°, then m∠P = __113°__   67 + ∠P = 180

⑧ If m∠M = 132°, then m∠P = __48°__   132 + ∠P = 180°

⑨ If m∠M = 44°, then m∠P = __136°__   44 + ∠P = 180

∠5 and ∠6 are complementary angles. ∠6 and ∠7 are supplementary angles.
All are nonadjacent.   **∠5 + ∠6 = 90°**   **∠6 + ∠7 = 180 def of suppl.**
                         def of comp.

⑩ If m∠5 = 34°, then m∠6 = __56°__, and m∠7 = __124°__

⑪ If m∠6 = 50°, then m∠5 = __40°__, and m∠7 = __130°__

⑫ If m∠7 = 132°, then m∠6 = __48°__, and m∠5 = __42°__

Congruence of Angles and Addition Properties

Page 10.

Show geometry + Justify

Find the values of each of the following.
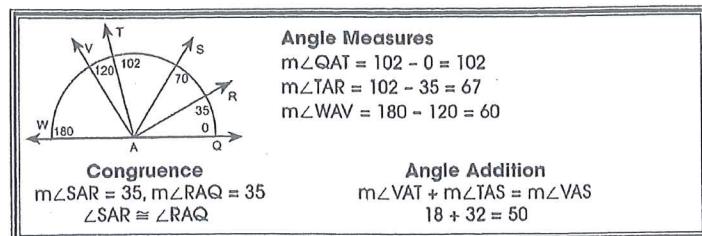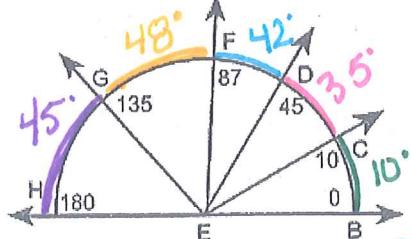
1. m∠CEB = __10°__

3. m∠BEG = __135°__

5. m∠BEC + m∠CEF = $10 + (35+42) = 87°$

7. m∠HEG + m∠CED = $45 + 35 = 80°$

9. m∠GED + m∠DEC = __125°__ $90 + 35 =$

11. m∠HEF − m∠HEG = __48°__ $93 − 45$

13. m∠HEG + m∠CEF − m∠BEC = $45 + (42+35) − 10 = 112°$

15. Name a pair of congruent angles. __∠HEG ≅ ∠DEB__

- - -
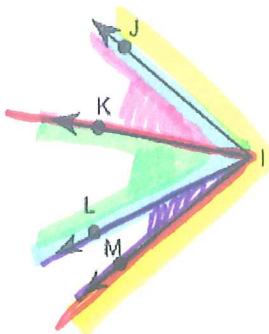
17. m∠JIK + m∠KIL = __∠JIL__

19. m∠KIJ = 28 & m∠LIK = 39; m∠LIJ = __67°__
$$∠KIJ + ∠LIK = ∠LIJ$$
$$28 + 39 = 67°$$

20. m∠MIJ = 81 & m∠MIL = 12; m∠LIJ = __69°__
$$∠MIL + ∠LIJ = ∠MIJ$$
$$12 + ∠LIJ = 81$$
$$-12 \qquad -12$$

Find x.

21. m∠KIL = 2x; m∠LIM = x; m∠KIM = 4x − 17   x = __17°__

angle addition.

$$∠KIL + ∠LIM = ∠KIM$$
$$2x + x = 4x − 17$$
$$3x = 4x − 17$$
$$-4x \qquad -4x$$
$$\frac{-1x}{-1} = \frac{-17}{-1}$$

{ must show all work

22. m∠JIK = x; m∠KIL = 3x + 5; m∠JIL = 5x − 15   x = __20°__

angle addition

$$∠JIK + ∠KIL = ∠JIL$$
$$x + 3x + 5 = 5x − 15$$
$$4x + 5 = 5x − 15$$
$$-4x \qquad -4x$$
$$5 = x − 15$$
$$+15 \qquad +15$$

{ must show all work!

Classifying Angles

Page 11.
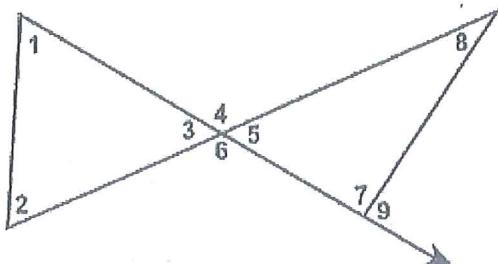
In the figure, m∠7 = 90°

1. Name the angles which appear to be:

   a. acute ∠1, ∠2, ∠3, ∠5, ∠8

   b. obtuse ∠4, ∠6

   c. right ∠7 and ∠9

2. Name five pairs of supplementary angles. ∠3 and ∠4, ∠5 and ∠6, ∠4 and ∠5, ∠6 and ∠3, ∠7 and ∠9

3. ∠7 and ∠9 form a __linear pair__.

∠10 and ∠11 are complementary angles.   Show geometry + Justify

4. m∠10 = 32°; m∠11 = __58°__   ∠10 + ∠11 = 90   def of compl.

$$32 + \angle 11 = 90$$
$$-32 \qquad -32$$
$$\boxed{\angle 11 = 58°}$$

5. m∠11 = 72°; m∠10 = __18°__

∠11 + ∠10 = 90°   def of compl.
$$72 + \angle 10 = 90$$
$$\angle 11 = 18°$$

6. m∠10 = 4x; m∠11 = 2x; x = __15__   ∠10 + ∠11 = 90   def of compl.

$$4x + 2x = 90$$
$$6x = 90$$
$$x = 15$$

∠13 and ∠14 are complementary angles, and   Show geometry + Justify
∠14 and ∠15 are supplementary angles.

11. m∠13 = 47°; m∠14 = __43°__; m∠15 = __137°__

① ∠13 + ∠14 = 90   def of compl.
$$47 + \angle 14 = 90$$
$$\boxed{\angle 14 = 43°}$$

② ∠14 + ∠15 = 180   def of suppl.
$$43 + \angle 15 = 180$$
$$-43 \qquad -43$$
$$\angle 15 = 137°$$

12. m∠14 = 78°; m∠13 = __12°__; m∠15 = __102°__

① ∠13 + ∠14 = 90   def of compl.
$$\angle 13 + 78 = 90$$
$$\boxed{\angle 13 = 12°}$$

② ∠14 + ∠15 = 180   def of suppl.
$$78 + \angle 15 = 180$$
$$\boxed{\angle 15 = 102°}$$

13. m∠15 = 135°; m∠13 = __45°__; m∠14 = __45°__

① ∠15 + ∠14 = 180   def of suppl.
$$135 + \angle 14 = 180$$
$$\boxed{\angle 14 = 45°}$$

② ∠13 + ∠14 = 90   def of comp.
$$\angle 13 + 45 = 90$$
$$\angle 13 = 45°$$