NAME **Key**   DATE _____   SCORE _____

Preparing for College Entrance Exams
Chapter 1

Directions: Write the letter of the best answer in the space provided.

Answers

1. _**B**_
2. _**B**_
3. _**A**_
4. _**B**_
5. _**C**_
6. _**E**_
7. _**D**_

1. Points A, B, C, and D are coplanar. A, B, and C are collinear but B, C, and D are not. How many different lines are determined by points A, B, C, and D?

   (A) 3   **(B)** 4   **(C)** infinitely many
   (D) cannot be determined from the information given

2. j and k are intersecting lines. A and B are points on j, and C and D are points on k. How many planes contain points A, B, C, and D?

   (A) none   **(B)** exactly one   **(C)** infinitely many
   (D) cannot be determined from the information given

3. Points M, A, T, H, and P are arranged on a line so that T is the midpoint of $\overline{HM}$, M is the midpoint of $\overline{HA}$, and P is the midpoint of $\overline{AT}$. Which of the following are true?

   I. P is on $\overline{MA}$.   II. M is on $\overrightarrow{TH}$.   III. $PH = TA$

   (A) I only   **(B)** II only   **(C)** III only
   (D) I and II only   **(E)** I, II, and III

4. In the figure, $AC = 24$, $AB = 6x - 6$, $BC = 5x - 3$, and $BE = 3x + 2$. Which do you know is true?

   I. $\overline{AC}$ bisects $\overline{DE}$.
   II. $\overline{DE}$ bisects $\overline{AC}$.
   III. $\overleftrightarrow{DE}$ bisects $\overleftrightarrow{AC}$.

   (A) I only   **(B)** II only   **(C)** III only
   (D) I and II only   **(E)** II and III only

Question 4

5. Find the values of x and y. (The figure is not drawn to scale.)

   (A) $x = 20$, $y = 34$ **(B)** $x = 10$, $y = 52$
   (C) $x = 12$, $y = 18$ **(D)** $x = 11$, $y = 7$

Question 5

6. Point A lies in plane K, but point B does not. A line l through B intersects K at point C. Which of the following must be true?

   I. A, B, and C are coplanar.
   II. The midpoint of $\overline{AB}$ lies in plane K.
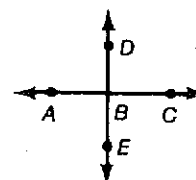   III. The midpoint of $\overline{AC}$ lies in plane K.

   (A) I only   **(B)** II only   **(C)** III only
   (D) I and II only   **(E)** I and III only

7. In the figure, $\overrightarrow{BD}$ bisects $\angle ABE$, $\overrightarrow{BE}$ bisects $\angle ABG$, $m\angle EBF = 37$, and $m\angle CBG = 44$. Find $m\angle DBF$. (The figure is not drawn to scale.)
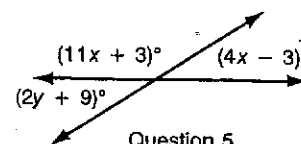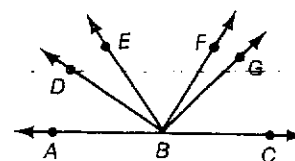
   (A) 68   **(B)** 34   **(C)** 82   **(D)** 71

Question 7

Preparing for College Entrance Exams
Chapter 2

Directions: Write the letter of the best answer in the space provided.

1. Which of the following statements is equivalent to the statement "*p* implies *q*"?

    (A) *p* if and only if *q*.   (B) If *p*, then *q*.   (C) *q* only if *p*.
    (D) *p* if *q*.   (E) none of these

2. If $4x = 9 - \frac{1}{2}x$, which of the following must be true?

    I. $4x - 9 = \frac{1}{2}x$

    II. $4x - \frac{1}{2}x = 9$

    III. $8x = 18 - x$

    IV. $\frac{1}{2}x = 9 - 4x$

    (A) I only   (B) II only   (C) III only
    (D) II and III only   (E) III and IV only

3. The measure of the supplement of an angle is 14 less than 3 times the measure of the complement. Find the measure of the complement.

    (A) 38   (B) 52   (C) 142   (D) 19   (E) none of these

4. Which of the following must be known to be true to prove that $BC < CD$?

    I. $AB = CD$

    II. $BC < AB$

    III. $AB + BC + CD = AD$

    (A) I only   (B) II only   (C) I and II only
    (D) II and III only   (E) I, II, and III

5. $\angle ABC$ and $\angle CBD$ are adjacent congruent angles, and $m\angle ABD = 160$. What are the two possible measures for $\angle ABC$?
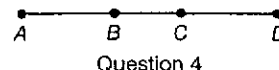
    (A) 80, 160   (B) 100, 160   (C) 80, 100
    (D) 90, 180   (E) 160, 200

6. If $abc = 3$ and $a = b$, then *c* equals which of the following?

    (A) $\frac{3}{a^2}$ (B) $3 - a^2$ (C) $3 - 2a$
    (D) $3 + 2a$ (E) $\frac{3}{2a}$

Answers

1. B
2. E
3. B
4. C
5. C
6. A

A ●————● B ●—● C ————● D

Question 4

Preparing for College Entrance Exams
Chapter 3

Directions: Write the letter of the best answer in the space provided.

1. Use inductive reasoning to determine a formula for the number of regions into which a circle is divided by n diameters.

   (A) $n + 1$ (B) 2^n (C) $2n + 2$ (D) $2n$

2. A and B are regular polygons and A has 2 more sides than B. The measure of each interior angle of A is 6 greater than the measure of the interior angle of B. How many sides does A have?

   (A) 6 (B) 8 (C) 10 (D) 12

3. Planes K and J are parallel. Line p lies in plane K and line q lies in plane J. Which of the following statements must be true?

   (A) p and q are always parallel. (B) p and q are sometimes parallel.
   (C) p and q are never parallel. (D) p and q are always coplanar.
   (E) p and q sometimes intersect.

4. $\overline{AD} \perp \overline{DC}, \overline{AB} \parallel \overline{DC}, \overline{DE}$ bisects $\angle ADC$, and $m\angle ECB = 40$. Find $m\angle DEC$. (The figure is not drawn to scale.)

   (A) 90 (B) 95 (C) 85
   (D) cannot be determined from the information given

5. Find $m\angle ABC$ if $m\angle A = 48$ and $m\angle C = 46$. (The figure is not drawn to scale.)

   (A) 94 (B) 86 (C) 84
   (D) cannot be determined from the information given

6. Find $m\angle ADC$. (The figure is not drawn to scale.)

   (A) 53 (B) 43 (C) 137 (D) 127

7. In the figure, $m\angle ABE = m\angle EDF = m\angle BEC$. Which of the following pairs of lines must be parallel?
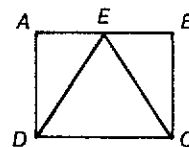
   I. $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ II. $\overleftrightarrow{BE}$ and $\overleftrightarrow{DF}$ III. $\overleftrightarrow{AE}$ and $\overleftrightarrow{CF}$

   (A) I only (B) II only (C) III only
   (D) I and II only (E) I and III only

8. In $\triangle ABC$, $\overrightarrow{BD}$ and $\overrightarrow{CD}$ are angle bisectors, and $\overleftrightarrow{CE} \parallel \overleftrightarrow{BD}$. If $m\angle BAC = 70$, what is $m\angle DCE$?
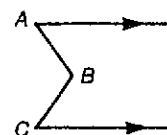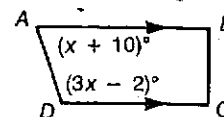
   (A) 70 (B) 105 (C) 125 (D) 153.5

Answers

1. D
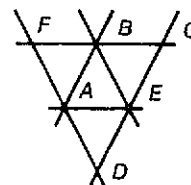2. D
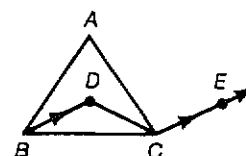3. B
4. D
5. A
6. D
7. D
8. C

Question 4

Question 5

$(x + 10)°$
$(3x - 2)°$
Question 6

Question 7
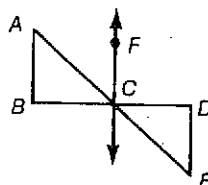

Question 8

Preparing for College Entrance Exams
Chapter 4

Directions: Write the letter of the best answer in the space provided.

Answers

1. $\overline{AB} \perp \overline{BD}$, $\overline{AB} \parallel \overline{DE}$, $\overline{CF}$ bisects $\overline{AE}$ and $\overline{BD}$, and $AB = DE$. What can you conclude?

   (A) $\triangle ABC \cong \triangle DEC$ (B) $\triangle ABC \cong \triangle EDC$
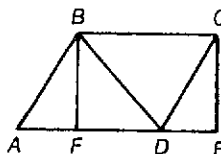   (C) $\triangle ABC \cong \triangle CDE$ (D) none of these

   Question 1

2. $\overline{AB} \parallel \overline{CD}$, $AB = CD$, and $AF = FD = DE$. What can you conclude? (Figure is not drawn to scale.)
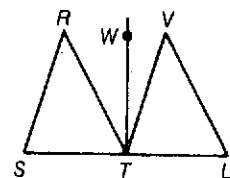
   I. $\triangle ABF \cong \triangle DCE$
   II. $\triangle ABF \cong \triangle DBF$
   III. $\triangle DBF \cong \triangle DCE$

   (A) I only   (B) II only
   (C) III only   (D) I, II, and III

   Question 2

3. $\overline{SR} \parallel \overline{TV}$, $\overline{TR} \cong \overline{UV}$, and $\overrightarrow{TW}$ bisects both $\overline{SU}$ and $\angle RTV$. What can you conclude?

   (A) The SAS Postulate can be used to prove that $\triangle RST \cong \triangle VTU$.
   (B) The ASA Postulate can be used to prove that $\triangle RST \cong \triangle VTU$.
   (C) The SSS Postulate can be used to prove that $\triangle RST \cong \triangle VTU$.
   (D) There is not sufficient information to prove that $\triangle RST \cong \triangle VTU$.
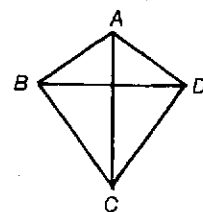
   Question 3

4. $\overline{AC}$ bisects $\angle BAD$, $\overline{AB} \perp \overline{BC}$, and $\overline{AD} \perp \overline{CD}$. The given information is sufficient to prove which of the following?

   I. $\overline{AC} \perp \overline{BD}$
   II. $\overline{AC}$ bisects $\overline{BD}$.
   III. $\overline{AB} \parallel \overline{CD}$

   (A) I only   (B) II only   (C) III only
   (D) I and II only   (E) II and III only

   Question 4

5. P, Q, and R are collinear points with $PQ = QR$. Point S is equidistant from $\overrightarrow{QP}$ and $\overrightarrow{QR}$. Which of the following must be true?

   I. $\triangle PQS \cong \triangle RQS$
   II. S lies on the perpendicular bisector of $\overline{PR}$.
   III. S is equidistant from P and R.

   (A) I only   (B) II only   (C) I and II only
   (D) I and III only   (E) I, II, and III

6. $BA = BE$, $\overline{BE} \parallel \overline{CD}$, and $m\angle ACD = 56$. Find $m\angle ADC$.

   (A) 56   (B) 62   (C) 68   (D) 124
   (E) cannot be determined from the information given
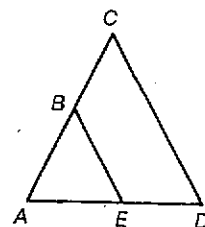
   Question 6

Answers

1. __B__
2. __A__
3. __D__
4. __D__
5. __E__
6. __B__

Preparing for College Entrance Exams
Chapter 5

Directions: Write the letter of the best answer in the space provided.

Answers

1. __D__
2. __C__
3. __A__
4. __A__
5. __B__
6. __C__
7. __C__

1. In quadrilateral $TUVW$, $\overline{TW} \parallel \overline{UV}$. What additional information is needed to prove that $\overline{TV}$ bisects $\overline{WU}$?

   I. $\overline{TU} \parallel \overline{WV}$
   II. $TW = UV$
   III. $TU = WV$

  (A) I only   **(B)** II only   **(C)** III only
  (D) I or II   **(E)** I or II or III

2. A rhombus is also a square only if it is also a(n):

  (A) parallelogram   **(B)** trapezoid   **(C)** rectangle
  (D) equilateral quadrilateral   **(E)** convex polygon

3. $ABCD$ is a quadrilateral with $m\angle A = 2x$, $m\angle B = 3x - 15$, $m\angle C = 4x - 90$, and $m\angle D = x + 15$. What can you conclude?

   I. $m\angle A = 90$
   II. $ABCD$ is a rectangle.
   III. $ABCD$ is a parallelogram.

  (A) I only   **(B)** I and III only   **(C)** III only
  (D) I, II, and III   **(E)** none of these

4. B and G are the midpoints of $\overline{AC}$ and $\overline{AF}$, respectively. C and F are the midpoints of $\overline{BD}$ and $\overline{GE}$, respectively. $BGED$ is a trapezoid. If $CF = 36$, find DE.

  (A) 54   **(B)** 72   **(C)** 45
  (D) cannot be determined from the information given

Question 4

5. $\overline{RS} \parallel \overline{UT}$, $RV = VT$, and $\overline{RT}$ bisects $\angle URS$. Which of the following best describes $RSTU$? (The figure is not drawn to scale.)

  (A) parallelogram   **(B)** rhombus   **(C)** rectangle
  (D) square   **(E)** none of these

Question 5

6. For quadrilateral $WXYZ$ it is known that $WX = YZ$. Which of the following additional pieces of information is *not* sufficient to prove that $WXYZ$ is a parallelogram?
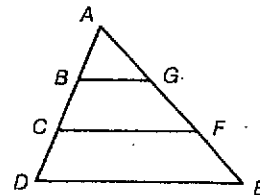
  (A) $\overline{WX} \parallel \overline{YZ}$ **(B)** $XY = WZ$ **(C)** $\overline{XY} \parallel \overline{WZ}$
  (D) $\angle W$ is supplementary to $\angle Z$.
  (E) $\overleftrightarrow{WY}$ is the perpendicular bisector of $\overline{XZ}$.

7. $ABEG$ is a rectangle. $\overline{HC}$ bisects $\overline{AF}$ and $\overline{BD}$. Find the value of the expression $\frac{BD}{CE} \cdot \frac{AF}{HG}$.
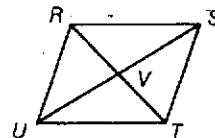
  (A) 1   **(B)** 2   **(C)** 4
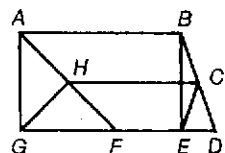 **(D)** cannot be determined from the information given

Question 7

Preparing for College Entrance Exams
Chapter 6

Directions: Write the letter of the best answer in the space provided.

1. For which of the following statements are the statement, its contrapositive, its converse, and its inverse all true?

    I. If $a > 1$, then $a^2 > a$.

    II. Vertical angles are congruent.

    III. If two lines form congruent adjacent angles, then the lines are perpendicular.

    (A) I only   **(B)** II only   **(C)** III only

    (D) I and III only   **(E)** I, II, and III

2. In $\triangle ABC, AB = 7$ and $BC = 10$. AC *cannot* equal:

    (A) 7   **(B)** 10   **(C)** 3.14   **(D)** 17   **(E)** $\frac{34}{3}$

3. In $\triangle ABC, m\angle A = 60$ and $m\angle DBC = 31$. $\overline{BD}$ bisects $\angle ABC$ and $\overline{CD}$ bisects $\angle ACB$. Which side of $\triangle ABC$ is the longest? (The figure is not drawn to scale.)

    (A) $\overline{BD}$ **(B)** $\overline{DC}$ **(C)** $\overline{AC}$

    (D) cannot be determined from the information given

4. Based on the information in the diagram at the right, which of the following is true? (The figure is not drawn to scale.)

    (A) $d > a > e > c > b$ **(B)** $d > e > c > b > a$

   **(C)** $e > a > b > c > d$ **(D)** $d > a > e > b > c$

Questions 5–7 each consist of two quantities, one in Column A and one in Column B. Figures may not be drawn to scale. Compare the two quantities and in the answer blank write:

(A) if the quantity in Column A is greater.

(B) if the quantity in Column B is greater.

(C) if the two quantities are equal.

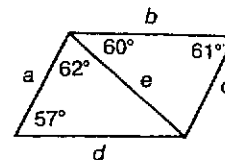**(D)** if the relationship cannot be determined from the information given.

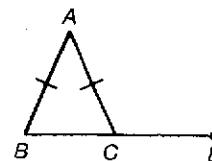|	Column A	Column B
5.	$m\angle ACE$	$m\angle BAC$
6.	$m\angle ABC$	$m\angle ACB$
7.	$m\angle 1 + m\angle 4$	$m\angle 2 + m\angle 3$

Answers

1. C
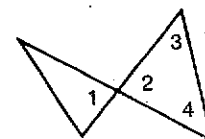2. D
3. C
4. A
5. A
6. C
7. B
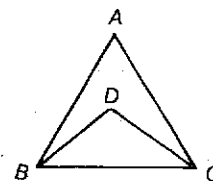
Question 3

Question 4

Questions 5, 6

$m\angle 3 > m\angle 4$
Question 7

Preparing for College Entrance Exams
Chapter 7

Directions: Write the letter of the best answer in the space provided.

1. The ratio of the measures of two supplementary angles is 7:8. Which proportion(s) could you use to find the measures of the angles?

    I. $\frac{x}{y} = \frac{7}{8}$

    II. $\frac{x}{y} = \frac{8}{7}$

    III. $\frac{x}{180-x} = \frac{7}{8}$

    IV. $\frac{x}{180-x} = \frac{8}{7}$

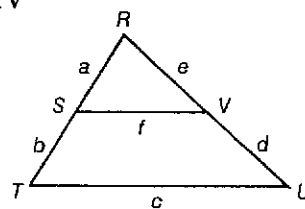   (A) I only   (B) II only   (C) I and II only

    (D) III and IV only   (E) I, II, III, and IV

2. S and V are the midpoints of $\overline{RT}$ and $\overline{RU}$, respectively. Which of the following is not true?

    (A) $\frac{c}{f} = \frac{b}{a}$

    (B) $\frac{d}{e} = \frac{b}{a}$

    (C) $\frac{c}{e+d} = \frac{f}{e}$

    (D) $\frac{f}{a} = \frac{c}{a+b}$
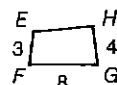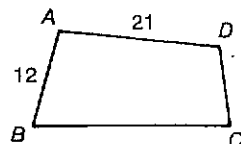
Question 2

3. Quad. $ABCD \sim$ quad. $HGFE$. Find the perimeter of $ABCD$.

    (A) 88   (B) 22   (C) 66   (D) 31

Question 3

4. In the triangle shown, $\overline{UY} \parallel \overline{VX}$, and $\overline{TW}$ is the perpendicular bisector of both $\overline{UY}$ and $\overline{VX}$. How many pairs of similar triangles are shown in the figure?
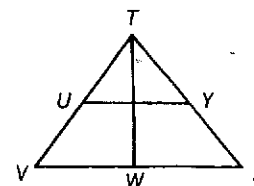
    (A) 3   (B) 4   (C) 5   (D) 6   (E) 7

Question 4

5. Any two equilateral triangles are similar. Which of the following can be used to prove such similarity?

    I. AA Similarity Postulate

    II. SSS Similarity Theorem

    III. SAS Similarity Theorem

    (A) I only   (B) II only   (C) III only

    (D) I and II only   (E) I, II, and III

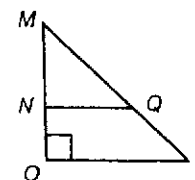6. In right $\triangle MOP$, $\overline{NQ} \perp \overline{MO}$. $MN = 9$, $NO = 7$, and $MP = 20$. Find MQ.

    (A) 11.25   (B) 8.75   (C) 7.5   (D) 9.25   (E) 10.75

Question 6

Answers

1. D
2. A
3. C
4. E
5. E
6. A

Cumulative Review: Chapters 1–7

True-False Exercises

**Write T or F to indicate your answer.**

1. If $AX = XB$, then X must be the midpoint of $\overline{AB}$. **F**

2. Definitions may be used to justify statements in a proof. **T**

3. If a line and a plane are parallel, then the line is parallel to every line in the plane. **F**

4. When two parallel lines are cut by a transversal, any two angles formed are either congruent or supplementary. **T**

5. If the sides of one triangle are congruent to the corresponding sides of another triangle, then the corresponding angles must also be congruent. **T**

6. Every isosceles trapezoid contains two pairs of congruent angles. **T**

7. If a quadrilateral has two pairs of supplementary angles, then it must be a parallelogram. **F**

8. If the diagonals of a quadrilateral bisect each other and are congruent, then the quadrilateral must be a square. **F**

9. In $\triangle PQR$, $m\angle P = m\angle R = 50$. If T lies on $\overline{PR}$ and $m\angle PQT = 42$, then $PT < TR$. **F**

10. In quad. $WXYZ$, if $WX = XY = 25$, $YZ = 20$, $ZW = 16$, and $WY = 20$, then $\overline{WY}$ divides the quadrilateral into two similar triangles. **T**

11. Two equiangular hexagons are always similar. **F**

Multiple-Choice Exercises

Indicate the best answer by writing the appropriate letter.

1. Which pair of angles must be congruent?
   a. $\angle 1$ and $\angle 4$ b. $\angle 2$ and $\angle 3$
   c. $\angle 2$ and $\angle 4$ **(d.)** $\angle 4$ and $\angle 5$
   e. $\angle 2$ and $\angle 8$
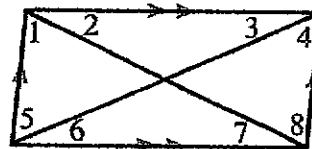
2. If a, b, c, and d are coplanar lines such that $a \perp b$, $c \perp d$, and $b \parallel c$, then:
   a. $a \perp d$ b. $b \parallel d$ **(c.)** $a \parallel d$ d. $a \parallel c$ e. none of these

3. If $\triangle ABC \cong \triangle NDH$, then it is also true that:
   a. $\angle B \cong \angle H$ b. $\angle A \cong \angle H$ c. $\overline{AB} \cong \overline{HD}$
   (d.) $\overline{CA} \cong \overline{HN}$ e. $\triangle CBA \cong \triangle DHN$

4. If $PQRS$ is a parallelogram, which of the following *must* be true?
   a. $PQ = QR$ **(b.)** $PQ = RS$ c. $PR = QS$ d. $\overline{PR} \perp \overline{QS}$ e. $\angle Q \cong \angle R$

5. Which of the following can be the lengths of the sides of a triangle?
   a. 3, 7, 10   b. 3, 7, 11   **(c.)** 0.5, 7, 7   d. $\frac{1}{2}, \frac{1}{4}, \frac{1}{5}$ e. 1, 3, 5

Always-Sometimes-Never Exercises

Write A, S, or N to indicate your choice.

A   **1.** If a conditional is false, then its converse is __?__ false. **S**

     2. Two vertical angles are __?__ adjacent. **N**

     3. An angle __?__ has a complement. **S**

     4. Two parallel lines are __?__ coplanar. **A**

     5. Two perpendicular lines are __?__ both parallel to a third line. **N**

     6. A scalene triangle is __?__ equiangular. **N**

     7. A regular polygon is __?__ equilateral. **A**

     8. A rectangle is __?__ a rhombus. **S**

     9. If $\overline{RS} \cong \overline{MN}$, $\overline{ST} \cong \overline{NO}$, and $\angle R \cong \angle M$, then $\triangle RST$ and $\triangle MNO$ are __?__ congruent. **S**

   10. The HL method is __?__ appropriate for proving that two acute triangles are congruent. **N**

   11. If $AX = BX$, $AY = BY$, and points A, B, X, and Y are coplanar, then $\overline{AB}$ and $\overline{XY}$ are __?__ perpendicular. **A**

B **12.** The diagonals of a trapezoid are __?__ perpendicular. **S**

   13. If a line parallel to one side of a triangle intersects the other two sides, then the triangle formed is __?__ similar to the given triangle. **A**

   14. If $\triangle JKL \cong \triangle NET$ and $\overline{NE} \perp \overline{ET}$, then it is __?__ true that $LJ < TE$. **N**

   15. If $AB + BC > AC$, then A, B, and C are __?__ collinear points. **S**

   16. A triangle with sides of length $x - 1$, x, and x is __?__ an obtuse triangle. **N**

Completion Exercises

**Complete each statement in the best way.**

A   **1.** If $\overrightarrow{YW}$ bisects $\angle XYZ$ and $m\angle WYX = 60$, then $m\angle XYZ =$ __?__ **120**

     2. The acute angles of a right triangle are __?__. **Complementary**

     3. A supplement of an acute angle is a(n) __?__ angle. **Obtuse**

     4. Adjacent angles formed by __?__ lines are congruent. **perpendicular**

     5. The measure of each interior angle of a regular pentagon is __?__. **108**

     6. In $\triangle ABC$ and $\triangle DEF$, $\angle A \cong \angle D$ and $\angle B \cong \angle E$. $\triangle ABC$ and $\triangle DEF$ must be __?__. **Similar**

B **7.** When the midpoints of the sides of a rhombus are joined in order, the resulting quadrilateral is best described as a __?__. **rectangle**

     8. If $\dfrac{r}{s} = \dfrac{t}{u}$, then $\dfrac{r+s}{t+u} = \dfrac{?}{?}$. $\dfrac{s}{u}$

     9. The ratio of the measures of the acute angles of a right triangle is $3:2$. The measure of the smaller acute angle is __?__. **36**

Algebraic Exercises

**In Exercises 1–9 find the value of x.**

A   1. On a number line, R and S have coordinates -8 and x, and the midpoint of $\overline{RS}$ has coordinate -1.   *6*

2. Two vertical angles have measures $x^2 + 18x$ and $x^2 + 54$.   *3*

3. The measures of the angles of a quadrilateral are x, $x + 4$, $x + 8$, and $x + 12$.   *84*

4. The lengths of the legs of an isosceles triangle are $7x - 13$ and $2x + 17$.   *6*

5. Consecutive angles of a parallelogram have measures $6x$ and $2x + 20$.   *20*

6. A trapezoid has bases of length x and $x + 8$ and a median of length 15.   *11*

7. $\dfrac{3x - 1}{4x + 2} = \dfrac{2}{3}$ *7*   8. $\dfrac{5}{8} = \dfrac{x - 1}{6}$ *4¾*   9. $\dfrac{x}{x + 4} = \dfrac{x + 3}{x + 9}$ *6*

B   10. The measure of a supplement of an angle is 8 more than three times the measure of a complement. Find the measure of the angle.   *49*

11. In a regular polygon, the ratio of the measure of an exterior angle to the measure of an interior angle is 2:13. How many sides does the polygon have?   *15*

12. The sides of a parallelogram have lengths 12 cm and 15 cm. Find the lengths of the sides of a similar parallelogram with perimeter 90 cm.   *20 cm 25 cm*

13. A triangle with perimeter 64 cm has sides with lengths in the ratio 4:5:7. Find the length of each side.   *16 cm, 20 cm 28cm*

14. In $\triangle XYZ$, $XY = YZ$. Find the measure of $\angle Z$ if $m\angle X : m\angle Y = 5:2$.   *75*

15. In the diagram, $\overline{AB} \parallel \overline{DC}$ and $\overline{AD} \parallel \overline{GC}$. Find the values of x and y.   *X = 6 Y = 3.5*
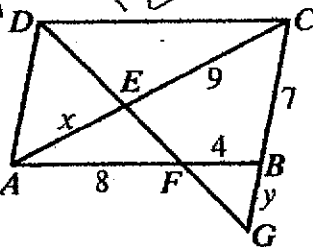
Proof Exercises   *(see attached)*

A   1. Given: $\overline{SU} \cong \overline{SV}$; $\angle 1 \cong \angle 2$
Prove: $\overline{UQ} \cong \overline{VQ}$

2. Given: $\overrightarrow{QS}$ bisects $\angle RQT$; $\angle R \cong \angle T$
Prove: $\overrightarrow{SQ}$ bisects $\angle RST$.

B   3. Given: $\triangle QRU \cong \triangle QTV$; $\overline{US} \cong \overline{VS}$
Prove: $\triangle QRS \cong \triangle QTS$

4. Given: $\overline{QS}$ bisects $\angle UQV$ and $\angle USV$; $\angle R \cong \angle T$
Prove: $\overline{RQ} \cong \overline{TQ}$

5. Given: $\overline{EF} \parallel \overline{JK}$; $\overline{JK} \parallel \overline{HI}$
Prove: $\triangle EFG \sim \triangle IHG$

6. Given: $\dfrac{JG}{HG} = \dfrac{KG}{IG}$, $\angle 1 \cong \angle 2$
Prove: $\overline{EF} \parallel \overline{HI}$
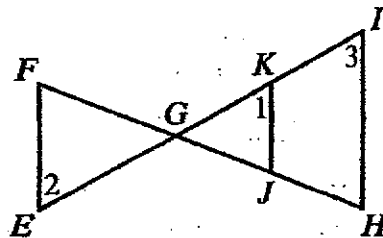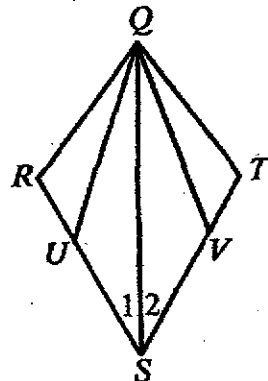
Mixed Review
Chapters 1–7
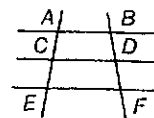
Directions: Write answers in the spaces provided.

1. $\overline{AB} \parallel \overline{CD} \parallel \overline{EF}$ and $BD = DF$. If $AC = 7$, find AE. _____ **14** _____

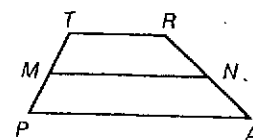2. Name the property that justifies the statement "If $y + 7 = 19$, then $y = 12$."
   _____ **SUBTRACTION PROP OF =** _____

3. $\triangle RGT$ is an isosceles right triangle with right angle G. $\overline{GX}$ is a perpendicular from G to $\overline{RT}$. Which method(s) could you use to prove $\triangle XGR \cong \triangle XGT$? **HL, AAS, ASA, SAS, SSS**

4. $\overline{MN}$ is the median of trapezoid $TRAP$. If $TR = 16$ and $PA = 38$, find MN. _____ **27** _____

5. Find the value of x. _____ **12** _____

   [figure, Ex. with triangle: sides 8, 10, x, $2x + 1$]
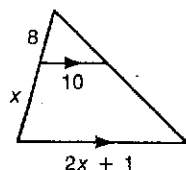
6. Assume the two statements "Whenever Jack Laughton drives, we are late" and "We were on time" are true. What, if anything, can you conclude? **Jack Laughton did not drive.**

7. X is a point on $\overline{AE}$ such that $AE = 13$, $AX = 3y - 5$, and $XE = 2y - 2$. Is X the midpoint of $\overline{AE}$? _____ **no** _____

8. In quadrilateral $ABCD$, $\overline{AD} \parallel \overline{BC}$, $m\angle D = 90$, $m\angle C = x + 15$, and $m\angle B = 2x + 15$. Find $m\angle A$. _____ **15** _____

9. A, B, and C are in the intersection of planes M and P. What is the relationship between A, B, and C? **collinear**

10. In $\triangle RST$, $\overline{UV} \parallel \overline{TS}$. What postulate allows you to conclude that $\triangle RUV \sim \triangle RTS$?
    AA ~ POST
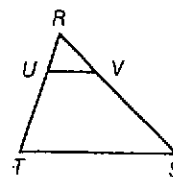
11. What is the correct first sentence for an indirect proof of the conditional "If $\angle A \not\cong \angle B$, then $\overline{AC} \not\cong \overline{BC}$."
   **Assume temp. that $\overline{AC} \cong \overline{BC}$**

12. $\angle A$ and $\angle B$ are alternate interior angles formed by a transversal of two parallel lines. If $m\angle A = 12x + 2$ and $m\angle B = 9x + 20$, find the measures of $\angle A$ and $\angle B$. _____ **74** _____

Ex. 1

Ex. 4

Ex. 10

(continued)

Mixed Review (continued)

13. Two sides of a triangle are 7 cm and 11 cm long. The third side of

the triangle must be longer than __4__ cm and shorter than

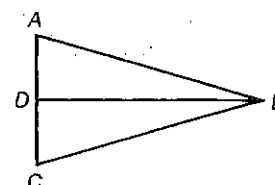__18__ cm.

14. In the diagram, if $\angle 1 \cong \angle 2$, find the value of x. __3.5__
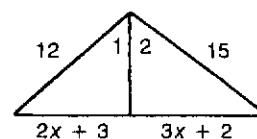
Ex. 14

15. $\triangle ABC$ is isosceles with median $\overline{BD}$. If $CD = 4x - 2$, and

$DA = 10 + x$, find the value of CA. __28__

16. $\triangle ABC$ is isosceles, $\overline{AB} \cong \overline{BC}$, and $\overline{BD} \perp \overline{CA}$. Name three *pairs* of

congruent angles. __$\angle A \cong \angle C$, $\angle ADB \cong \angle CDB$, $\angle ABD \cong \angle CBD$__

17. One angle of an isosceles trapezoid measures 72. Find the

measures of the other angles. __72, 108, 108__

18. Predict the next two numbers in the sequence: $8, 4, \frac{4}{3}, \frac{1}{3}, \ldots$

__1/15, 1/90__

19. In $\triangle MNO$ and $\triangle PQR$, $MN = 7$, $NO = 12$, $MO = 10$, $PQ = 10.5$,
$QR = 15$, and $PR = 18$.

a. Must the two triangles be similar? __yes__
b. What theorem or postulate justifies your answer to part (a)?

__SSS ~ Thm__

20. Quad. $NICE$ is a square. If $ME = 6x - 15$ and $MI = 3x$, find the

value of x. __5__
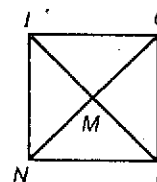
Ex. 20

In Exercises 21 and 22, $QUAD$ is a parallelogram with diagonals
intersecting at P.

21. If $QP = 5x - 4$, $PA = 4x + 16$, and $DU = 6x + 8$, find the value

of DU. __128__

22. If $QD > QU$, then which angle is larger, $\angle DPQ$ or $\angle QPU$?

__$\angle DPQ$__

23. The measure of the supplement of an angle is 4 more than 3 times
the measure of the angle. Find the measures of the angle, its

complement, and its supplement. __44, 46, 136__

24. The measure of each interior angle of a regular polygon is 5 times
the measure of an exterior angle. How many sides does the

polygon have? __12__

Algebra Review: *Radical Expressions*

The symbol $\sqrt{}$ always indicates the positive square root of a number. The *radical* $\sqrt{64}$ can be *simplified*.

Simplify.

Example 1   a. $\sqrt{56}$ b. $\sqrt{\dfrac{16}{3}}$ c. $(3\sqrt{7})^2$

Solution   a. $\sqrt{56} = \sqrt{4\cdot 14} = \sqrt{4}\cdot\sqrt{14} = 2\sqrt{14}$

b. $\sqrt{\dfrac{16}{3}} = \dfrac{\sqrt{16}}{\sqrt{3}} = \dfrac{4}{\sqrt{3}}\cdot\dfrac{\sqrt{3}}{\sqrt{3}} = \dfrac{4\sqrt{3}}{3}$

c. $(3\sqrt{7})^2 = 3\sqrt{7}\cdot 3\sqrt{7} = 3\cdot 3\cdot\sqrt{7}\cdot\sqrt{7} = 9\cdot 7 = 63$

1. $\sqrt{36}$ 6   2. $\sqrt{81}$ 9   3. $\sqrt{24}$ $2\sqrt{6}$ 4. $\sqrt{98}$ $7\sqrt{2}$ 5. $\sqrt{300}$ $10\sqrt{3}$

6. $\sqrt{\dfrac{1}{4}}$ $\dfrac{1}{2}$ 7. $\dfrac{\sqrt{5}}{\sqrt{3}}$ $\dfrac{\sqrt{15}}{3}$ 8. $\sqrt{\dfrac{80}{25}}$ $\dfrac{4\sqrt{5}}{5}$ 9. $\dfrac{2\sqrt{3}}{\sqrt{12}}$ 1   10. $\sqrt{\dfrac{250}{48}}$ $\dfrac{5\sqrt{3}}{12}$

11. $\sqrt{13^2}$ 13   12. $(\sqrt{17})^2$ 17   13. $(2\sqrt{3})^2$ 12   14. $(3\sqrt{8})^2$ 72   15. $(9\sqrt{2})^2$ 16:

16. $5\sqrt{18}$ $15\sqrt{2}$ 17. $4\sqrt{27}$ $12\sqrt{3}$ 18. $6\sqrt{24}$ $12\sqrt{6}$ 19. $5\sqrt{8}$ $10\sqrt{2}$ 20. $9\sqrt{40}$ $18\sqrt{1}$

Solve for x. Assume x represents a positive number.

Example 2 $2^2 + x^2 = 4^2$

Solution $4 + x^2 = 16$
$x^2 = 12$
$x = \sqrt{12}$
$x = 2\sqrt{3}$

Example 3 $x^2 + (3\sqrt{2})^2 = 9^2$

Solution $x^2 + 18 = 81$
$x^2 = 63$
$x = \sqrt{63}$
$x = 3\sqrt{7}$

21. $3^2 + 4^2 = x^2$ 5   22. $x^2 + 4^2 = 5^2$ 3   23. $5^2 + x^2 = 13^2$ 12

24. $x^2 + 3^2 = 4^2$ $\sqrt{7}$ 25. $4^2 + 7^2 = x^2$ $\sqrt{65}$ 26. $x^2 + 5^2 = 10^2$ $5\sqrt{3}$

27. $1^2 + x^2 = 3^2$ $2\sqrt{2}$ 28. $x^2 + 5^2 = (5\sqrt{2})^2$ 5   29. $(x)^2 + (7\sqrt{3})^2 = (2x)^2$ 7

Challenge

Given regular hexagon *ABCDEF*, with center *O* and sides of length 12. Let *G* be the midpoint of $\overline{BC}$. Let *H* be the midpoint of $\overline{DE}$. $\overline{AH}$ intersects $\overline{EB}$ at *J* and $\overline{FG}$ intersects $\overline{EB}$ at *K*.

Find *JK*.

(*Hint:* Draw auxiliary lines $\overline{HG}$ and $\overline{DA}$.)