JEFFERSON MATH PROJECT
REGENTS AT RANDOM

The NY Geometry Regents Exams
Fall 2008-August 2010
(Answer Key)

www.jmap.org

Dear Sir

I have to acknolege the reciept of your favor of May 14. in which you mention that you have finished the 6. first books of Euclid, plane trigonometry, surveying & algebra and ask whether I think a further pursuit of that branch of science would be useful to you. there are some propositions in the latter books of Euclid, & some of Archimedes, which are useful, & I have no doubt you have been made acquainted with them. trigonometry, so far as this, is most valuable to every man, there is scarcely a day in which he will not resort to it for some of the purposes of common life. the science of calculation also is indispensible as far as the extraction of the square & cube roots; Algebra as far as the quadratic equation & the use of logarithms are often of value in ordinary cases: but all beyond these is but a luxury; a delicious luxury indeed; but not to be indulged in by one who is to have a profession to follow for his subsistence. in this light I view the conic sections, curves of the higher orders, perhaps even spherical trigonometry, Algebraical operations beyond the 2d dimension, and fluxions.

Letter from Thomas Jefferson to William G. Munford, Monticello, June 18, 1799.

Geometry Regents at Random
Answer Section

1 ANS: 3 PTS: 2 REF: fall0816ge TOP: Planes

2 ANS: 1

$(x,y) \rightarrow (x+3, y+1)$

PTS: 2 REF: fall0803ge TOP: Translations

3 ANS: 1

$\angle DCB$ and $\angle ADC$ are supplementary adjacent angles of a parallelogram. $180 - 120 = 60$. $\angle 2 = 60 - 45 = 15$.

PTS: 2 REF: 080907ge TOP: Parallelograms

4 ANS:

6. The centroid divides each median into segments whose lengths are in the ratio 2 : 1. $\overline{TD} = 6$ and $\overline{DB} = 3$

PTS: 2 REF: 011034ge TOP: Centroid

5 ANS: 1

$V = \pi r^2 h$

$1000 = \pi r^2 \cdot 8$

$r^2 = \frac{1000}{8\pi}$

$r \approx 6.3$

PTS: 2 REF: 080926ge TOP: Volume

6 ANS: 3 PTS: 2 REF: 011028ge TOP: Conditional Statements

7 ANS: 4 PTS: 2 REF: fall0818ge
TOP: Analytical Representations of Transformations

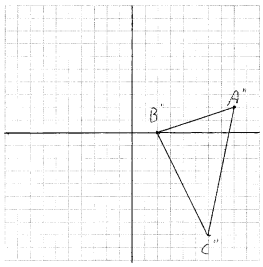
8 ANS: 2

The slope of $2x + 3y = 12$ is $-\frac{A}{B} = -\frac{2}{3}$. The slope of a perpendicular line is $\frac{3}{2}$. Rewritten in slope intercept form, (2) becomes $y = \frac{3}{2}x + 3$.

PTS: 2 REF: 060926ge TOP: Parallel and Perpendicular Lines

9 ANS: 3 PTS: 2 REF: fall0804ge TOP: Constructions

10 ANS:



$A''(8,2),\ B''(2,0),\ C''(6,-8)$

PTS: 4 REF: 081036ge TOP: Compositions of Transformations

11 ANS: 1

$A'(2,4)$

PTS: 2 REF: 011023ge TOP: Compositions of Transformations
KEY: basic

12 ANS: 2

$\frac{3}{7} = \frac{6}{x}$

$3x = 42$

$x = 14$

PTS: 2 REF: 081027ge TOP: Side Splitter Theorem

13 ANS: 4 PTS: 2 REF: 061008ge TOP: Trapezoids

14 ANS:

4. $l_1 w_1 h_1 = l_2 w_2 h_2$

$10 \times 2 \times h = 5 \times w_2 \times h$

$20 = 5w_2$

$w_2 = 4$

PTS: 2 REF: 011030ge TOP: Volume

15 ANS: 1

$M_x = \frac{-2+6}{2} = 2.$ $M_y = \frac{3+3}{2} = 3.$ The center is (2,3). $d = \sqrt{(-2-6)^2 + (3-3)^2} = \sqrt{64+0} = 8.$ If the diameter is 8, the radius is 4 and $r^2 = 16.$

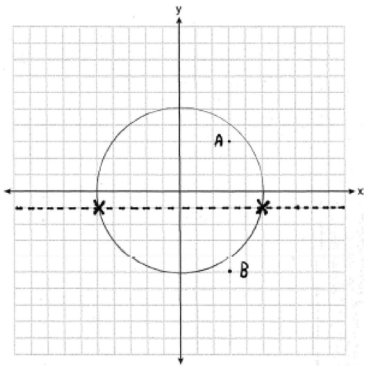
PTS: 2 REF: fall0820ge TOP: Equations of Circles

16 ANS: 4

$d = \sqrt{(146-(-4))^2 + (52-2)^2} = \sqrt{25{,}000} \approx 158.1$

PTS: 2 REF: 061021ge TOP: Distance

17 ANS:



PTS: 4 REF: fall0837ge TOP: Locus

18 ANS:

True. The first statement is true and the second statement is false. In a disjunction, if either statement is true, the disjunction is true.

PTS: 2 REF: 060933ge TOP: Compound Statements
KEY: disjunction

19 ANS: 2

$M_x = \frac{3x+5+x-1}{2} = \frac{4x+4}{2} = 2x+2.$ $M_Y = \frac{3y+(-y)}{2} = \frac{2y}{2} = y.$

PTS: 2 REF: 081019ge TOP: Midpoint

20 ANS: 4

Corresponding angles of similar triangles are congruent.

PTS: 2 REF: fall0826ge TOP: Similarity KEY: perimeter and area

21 ANS: 2

The slope of a line in standard form is $-\frac{A}{B}$ so the slope of this line is $-\frac{5}{3}$ Perpendicular lines have slope that are the opposite and reciprocal of each other.

PTS: 2 REF: fall0828ge TOP: Parallel and Perpendicular Lines

22 ANS: 1

Parallel lines intercept congruent arcs.

PTS: 2 REF: 061001ge TOP: Chords

23 ANS:

25. $d = \sqrt{(-3-4)^2 + (1-25)^2} = \sqrt{49+576} = \sqrt{625} = 25.$

PTS: 2 REF: fall0831ge TOP: Distance

24 ANS: 2

Parallel chords intercept congruent arcs. $\text{m}\overset{\frown}{AC} = \text{m}\overset{\frown}{BD} = 30.$ $180-30-30=120.$

PTS: 2 REF: 080904ge TOP: Chords

25 ANS: 1

$x + 2x + 2 + 3x + 4 = 180$

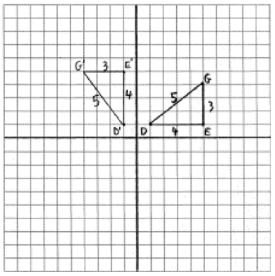
$6x + 6 = 180$

$x = 29$

PTS: 2 REF: 011002ge TOP: Interior and Exterior Angles of Triangles

26 ANS: 1 PTS: 2 REF: fall0807ge TOP: Constructions

27 ANS:



$D'(-1,1)$, $E'(-1,5)$, $G'(-4,5)$

PTS: 4 REF: 080937ge TOP: Properties of Transformations

28 ANS: 2 PTS: 2 REF: 011011ge TOP: Locus

29 ANS: 1

$\triangle PRT$ and $\triangle SRQ$ share $\angle R$ and it is given that $\angle RPT \cong \angle RSQ$.

PTS: 2 REF: fall0821ge TOP: Similarity Proofs

30 ANS: 4 PTS: 2 REF: 060913ge TOP: Conditional Statements

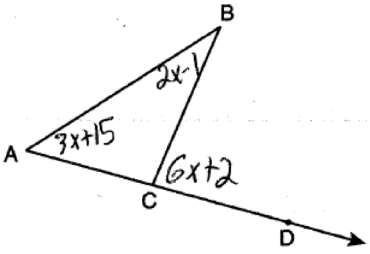
31 ANS: 4

Let $\overline{AD} = x$. $36x = 12^2$

$x = 4$

PTS: 2 REF: 080922ge TOP: Similarity KEY: leg

32 ANS: 1



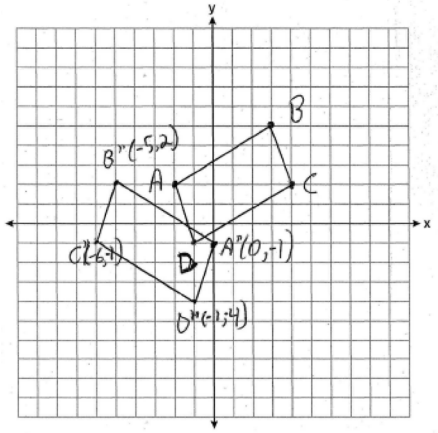
$3x + 15 + 2x - 1 = 6x + 2$

$5x + 14 = 6x + 2$

$x = 12$

PTS: 2 REF: 011021ge TOP: Exterior Angle Theorem

33 ANS:



PTS: 4 REF: 060937ge TOP: Compositions of Transformations
KEY: grids

34 ANS: 4 PTS: 2 REF: 080925ge
TOP: Centroid, Orthocenter, Incenter and Circumcenter

35 ANS:
$\overline{AC}$. $m\angle BCA = 63$ and $m\angle ABC = 80$. $\overline{AC}$ is the longest side as it is opposite the largest angle.

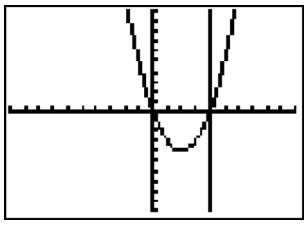
PTS: 2 REF: 080934ge TOP: Angle Side Relationship

36 ANS: 2 PTS: 2 REF: 061002ge TOP: Negations

37 ANS: 4
$L = 2\pi rh = 2\pi \cdot 5 \cdot 11 \approx 345.6$

PTS: 2 REF: 061006ge TOP: Volume

38 ANS: 1



$y = x^2 - 4x = (4)^2 - 4(4) = 0$. $(4,0)$ is the only intersection.

PTS: 2 REF: 060923ge TOP: Quadratic-Linear Systems

39 ANS: 1
$V = \frac{1}{3}\pi r^2 h = \frac{1}{3}\pi \cdot 4^2 \cdot 12 \approx 201$

PTS: 2 REF: 060921ge TOP: Volume and Lateral Area

40 ANS:
452. $SA = 4\pi r^2 = 4\pi \cdot 6^2 = 144\pi \approx 452$

PTS: 2 REF: 061029ge TOP: Volume and Surface Area

41 ANS: 3 PTS: 2 REF: fall0814ge TOP: Equations of Circles

42 ANS: 4

$\text{SA} = 4\pi r^2 \quad V = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi \cdot 6^3 = 288\pi$

$144\pi = 4\pi r^2$

$36 = r^2$

$6 = r$

PTS: 2 REF: 081020ge TOP: Volume and Surface Area

43 ANS: 3 PTS: 2 REF: 060905ge TOP: Reflections
KEY: basic

44 ANS: 3

$m = \frac{-A}{B} = \frac{5}{2}. \quad m = \frac{-A}{B} = \frac{10}{4} = \frac{5}{2}$

PTS: 2 REF: 011014ge TOP: Parallel and Perpendicular Lines

45 ANS: 1 PTS: 2 REF: 080911ge TOP: Equations of Circles

46 ANS: 2 PTS: 2 REF: 080927ge TOP: Planes

47 ANS: 4

Median $\overline{BF}$ bisects $\overline{AC}$ so that $\overline{CF} \cong \overline{FA}$.

PTS: 2 REF: fall0810ge TOP: Statements

48 ANS:

20. $5x + 10 = 4x + 30$

$x = 20$

PTS: 2 REF: 060934ge TOP: Similarity KEY: basic

49 ANS: 3 PTS: 2 REF: 081002ge TOP: Planes

50 ANS:

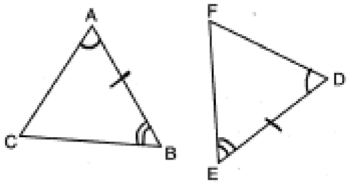
26. $x + 3x + 5x - 54 = 180$

$9x = 234$

$x = 26$

PTS: 2 REF: 080933ge TOP: Interior and Exterior Angles of Triangles

51 ANS: 3



PTS: 2 REF: 060902ge TOP: Triangle Congruency

52 ANS: 2 PTS: 2 REF: 081015ge TOP: Properties of Transformations

53 ANS:
34. $2x - 12 + x + 90 = 180$

$3x + 78 = 90$

$3x = 102$

$x = 34$

PTS: 2 REF: 061031ge TOP: Interior and Exterior Angles of Triangles
54 ANS: 4 PTS: 2 REF: fall0802ge TOP: Negations
55 ANS: 1 PTS: 2 REF: 060903ge TOP: Identifying Transformations
56 ANS: 4 PTS: 2 REF: 081005ge TOP: Constructions
57 ANS:
$y = \frac{2}{3}x - 9$. The slope of $2x - 3y = 11$ is $-\frac{A}{B} = \frac{-2}{-3} = \frac{2}{3}$. $-5 = \left(\frac{2}{3}\right)(6) + b$

$-5 = 4 + b$

$b = -9$

PTS: 2 REF: 080931ge TOP: Parallel and Perpendicular Lines
58 ANS: 4 PTS: 2 REF: 011009ge TOP: Constructions
59 ANS: 4
The slope of $y = -\frac{2}{3}x - 5$ is $-\frac{2}{3}$. Perpendicular lines have slope that are opposite reciprocals.

PTS: 2 REF: 080917ge TOP: Parallel and Perpendicular Lines
60 ANS: 4 PTS: 2 REF: 011019ge TOP: Similarity Proofs
61 ANS: 3 PTS: 2 REF: 060928ge TOP: Planes
62 ANS: 3
The diagonals of an isosceles trapezoid are congruent. $5x + 3 = 11x - 5$.

$6x = 18$

$x = 3$

PTS: 2 REF: fall0801ge TOP: Trapezoids
63 ANS: 1 PTS: 2 REF: 061009ge TOP: Converse
64 ANS: 2
$4(4x - 3) = 3(2x + 8)$

$16x - 12 = 6x + 24$

$10x = 36$

$x = 3.6$

PTS: 2 REF: 080923ge TOP: Segments Intercepted by Circle
KEY: two chords

65 ANS: 2

Parallel chords intercept congruent arcs. $\text{m}\overset{\frown}{AD} = \text{m}\overset{\frown}{BC} = 60$. $\text{m}\angle CDB = \frac{1}{2}\text{m}\overset{\frown}{BC} = 30$.

PTS: 2 REF: 060906ge TOP: Chords

66 ANS: 1

The centroid divides each median into segments whose lengths are in the ratio 2 : 1. $\overline{GC} = 2\overline{FG}$

$$\overline{GC} + \overline{FG} = 24$$
$$2\overline{FG} + \overline{FG} = 24$$
$$3\overline{FG} = 24$$
$$\overline{FG} = 8$$

PTS: 2 REF: 081018ge TOP: Centroid

67 ANS: 1

If $\angle A$ is at minimum (50°) and $\angle B$ is at minimum (90°), $\angle C$ is at maximum of 40° (180° - (50° + 90°)). If $\angle A$ is at maximum (60°) and $\angle B$ is at maximum (100°), $\angle C$ is at minimum of 20° (180° - (60° + 100°)).

PTS: 2 REF: 060901ge TOP: Interior and Exterior Angles of Triangles

68 ANS:

375π $L = \pi r l = \pi(15)(25) = 375\pi$

PTS: 2 REF: 081030ge TOP: Volume and Lateral Area

69 ANS: 3

The lateral edges of a prism are parallel.

PTS: 2 REF: fall0808ge TOP: Solids

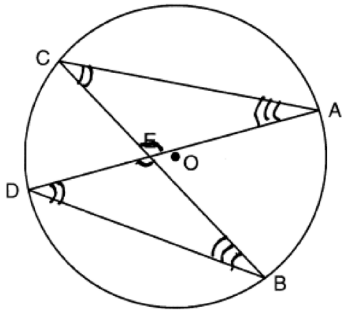
70 ANS: 4

$180 - (40 + 40) = 100$

PTS: 2 REF: 080903ge TOP: Isosceles Triangle Theorem

71 ANS: 3 PTS: 2 REF: 011007ge TOP: Isosceles Triangle Theorem

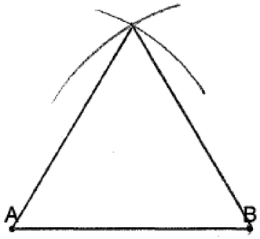
72 ANS: 2



PTS: 2 REF: 061026GE TOP: Arcs Determined by Angles

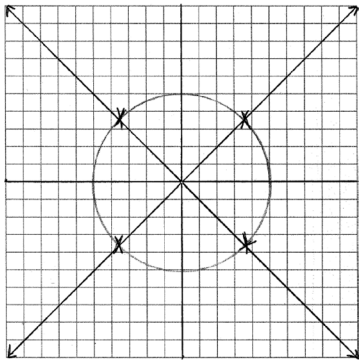
KEY: inscribed

73 ANS:



PTS: 2 REF: 011032ge TOP: Constructions

74 ANS:



PTS: 4 REF: 011037ge TOP: Locus

75 ANS:

Yes, $m\angle ABD = m\angle BDC = 44$ $180 - (93 + 43) = 44$ $x + 19 + 2x + 6 + 3x + 5 = 180$. Because alternate interior angles $\angle ABD$ and $\angle CDB$ are congruent, $\overline{AB}$ is parallel to $\overline{DC}$.

$$6x + 30 = 180$$
$$6x = 150$$
$$x = 25$$
$$x + 19 = 44$$

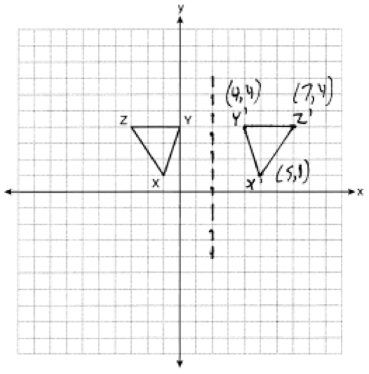
PTS: 4 REF: 081035ge TOP: Parallel Lines and Transversals

76 ANS:

$\overline{JK} \cong \overline{LM}$ because opposite sides of a parallelogram are congruent. $\overline{LM} \cong \overline{LN}$ because of the Isosceles Triangle Theorem. $\overline{LM} \cong \overline{JM}$ because of the transitive property. $JKLM$ is a rhombus because all sides are congruent.

PTS: 4 REF: 011036ge TOP: Special Quadrilaterals

77 ANS:



PTS: 2 REF: 061032ge TOP: Reflections KEY: grids

78 ANS: 1

$d = \sqrt{(-4-2)^2 + (5-(-5))^2} = \sqrt{36+100} = \sqrt{136} = \sqrt{4} \cdot \sqrt{34} = 2\sqrt{34}$.

PTS: 2 REF: 080919ge TOP: Distance

79 ANS: 4

$3y+1=6x+4$. $2y+1=x-9$

$3y=6x+3$ $2y=x-10$

$y=2x+1$ $y=\frac{1}{2}x-5$

PTS: 2 REF: fall0822ge TOP: Parallel and Perpendicular Lines

80 ANS: 4

Longest side of a triangle is opposite the largest angle. Shortest side is opposite the smallest angle.

PTS: 2 REF: 081011ge TOP: Angle Side Relationship

81 ANS: 2

$x^2 = 3(x+18)$

$x^2 - 3x - 54 = 0$

$(x-9)(x+6) = 0$

$x = 9$

PTS: 2 REF: fall0817ge TOP: Segments Intercepted by Circle
KEY: tangent and secant

82 ANS: 1 PTS: 2 REF: 061013ge TOP: Tangents
KEY: point of tangency

83 ANS: 2

$M_x = \frac{2+(-4)}{2} = -1$. $M_Y = \frac{-3+6}{2} = \frac{3}{2}$.

PTS: 2 REF: fall0813ge TOP: Midpoint

84 ANS: 4 PTS: 2 REF: 061015ge TOP: Identifying Transformations

85 ANS: 2

Because the triangles are similar, $\frac{\text{m}\angle A}{\text{m}\angle D} = 1$

PTS: 2 REF: 011022ge TOP: Similarity KEY: perimeter and area

86 ANS:

Contrapositive-If two angles of a triangle are not congruent, the sides opposite those angles are not congruent.

PTS: 2 REF: fall0834ge TOP: Conditional Statements

87 ANS: 2

$M_x = \frac{-2+6}{2} = 2.\ M_y = \frac{-4+2}{2} = -1$

PTS: 2 REF: 080910ge TOP: Midpoint

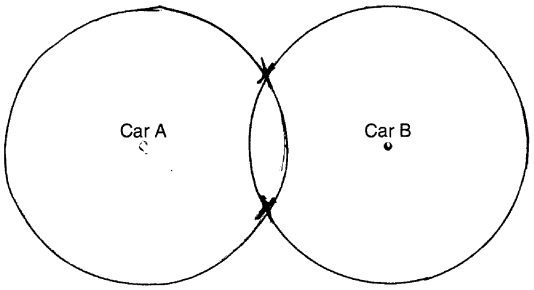
88 ANS: 3 PTS: 2 REF: 081026ge TOP: Contrapositive

89 ANS: 1

$\angle A = \frac{(n-2)180}{n} = \frac{(5-2)180}{5} = 108\ \angle AEB = \frac{180-108}{2} = 36$

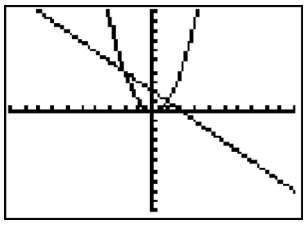
PTS: 2 REF: 081022ge TOP: Interior and Exterior Angles of Polygons

90 ANS:



PTS: 2 REF: 081033ge TOP: Locus

91 ANS: 3



PTS: 2 REF: fall0805ge TOP: Quadratic-Linear Systems

92 ANS: 2

$$x^2 + (x+7)^2 = 13^2$$
$$x^2 + x^2 + 7x + 7x + 49 = 169$$
$$2x^2 + 14x - 120 = 0$$
$$x^2 + 7x - 60 = 0$$
$$(x+12)(x-5) = 0$$
$$x = 5$$
$$2x = 10$$

PTS: 2 REF: 061024ge TOP: Pythagorean Theorem

93 ANS: 2

Longest side of a triangle is opposite the largest angle. Shortest side is opposite the smallest angle.

PTS: 2 REF: 060911ge TOP: Angle Side Relationship

94 ANS: 1

After the translation, the coordinates are $A'(-1,5)$ and $B'(3,4)$. After the dilation, the coordinates are $A''(-2,10)$ and $B''(6,8)$.

PTS: 2 REF: fall0823ge TOP: Compositions of Transformations

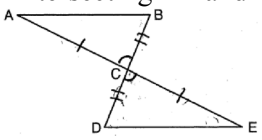
95 ANS: 4

The marked 60º angle and the angle above it are on the same straight line and supplementary. This unmarked supplementary angle is 120º. Because the unmarked 120º angle and the marked 120º angle are alternate exterior angles and congruent, $d \parallel e$.

PTS: 2 REF: 080901ge TOP: Parallel Lines and Transversals

96 ANS:

$\overline{AC} \cong \overline{EC}$ and $\overline{DC} \cong \overline{BC}$ because of the definition of midpoint. $\angle ACB \cong \angle ECD$ because of vertical angles. $\triangle ABC \cong \triangle EDC$ because of SAS. $\angle CDE \cong \angle CBA$ because of CPCTC. $\overline{BD}$ is a transversal intersecting $\overline{AB}$ and $\overline{ED}$. Therefore $\overline{AB} \parallel \overline{DE}$ because $\angle CDE$ and $\angle CBA$ are congruent alternate interior angles.



PTS: 6 REF: 060938ge TOP: Triangle Proofs

97 ANS: 1 PTS: 2 REF: 060920ge TOP: Graphing Circles

98 ANS: 4

$\triangle ABC \sim \triangle DBE.$ $\frac{\overline{AB}}{\overline{DB}} = \frac{\overline{AC}}{\overline{DE}}$

$\frac{9}{2} = \frac{x}{3}$

$x = 13.5$

PTS: 2 REF: 060927ge TOP: Side Splitter Theorem

99 ANS: 2

The slope of a line in standard form is $-\frac{A}{B}$, so the slope of this line is $\frac{-2}{-1} = 2$. A parallel line would also have a slope of 2. Since the answers are in slope intercept form, find the y-intercept: $y = mx + b$

$-11 = 2(-3) + b$

$-5 = b$

PTS: 2 REF: fall0812ge TOP: Parallel and Perpendicular Lines

100 ANS: 1

Translations and reflections do not affect distance.

PTS: 2 REF: 080908ge TOP: Properties of Transformations

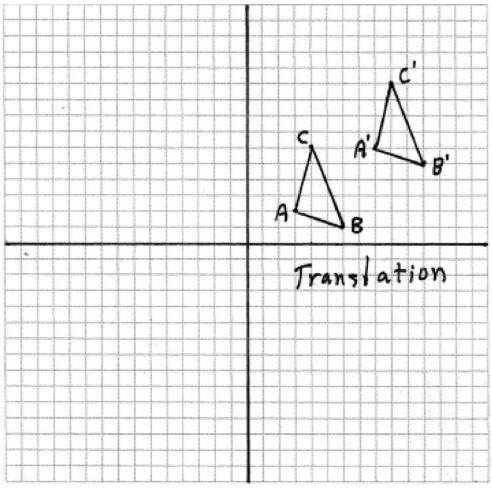
101 ANS: 1 PTS: 2 REF: 061012ge TOP: Constructions

102 ANS: 1 PTS: 2 REF: 081028ge

TOP: Centroid, Orthocenter, Incenter and Circumcenter

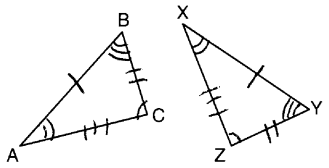
103 ANS: 4 PTS: 2 REF: 080914ge TOP: Planes

104 ANS:



PTS: 2 REF: fall0830ge TOP: Properties of Transformations

105 ANS: 4



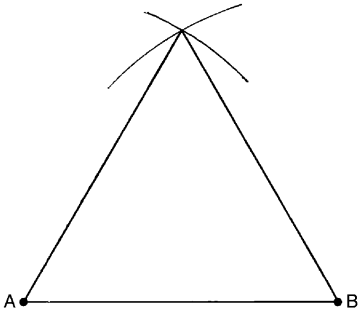
PTS: 2 REF: 081001ge TOP: Triangle Congruency

106 ANS: 3

$\frac{36+20}{2}=28$

PTS: 2 REF: 061019ge TOP: Arcs Determined by Angles
KEY: inside circle

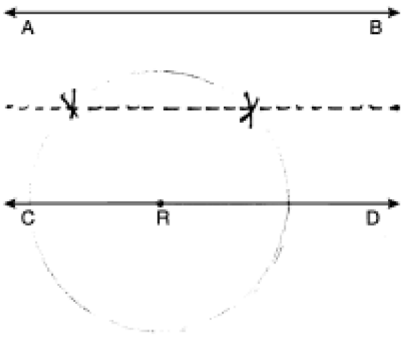
107 ANS:



PTS: 2 REF: 081032ge TOP: Constructions

108 ANS: 3 PTS: 2 REF: 011010ge TOP: Equations of Circles

109 ANS:



PTS: 2 REF: 061033ge TOP: Locus

110 ANS: 4

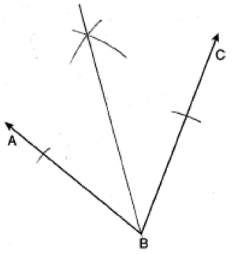
The slope of a line in standard form is $-\frac{A}{B}$, so the slope of this line is $\frac{-4}{2}=-2$. A parallel line would also have a slope of –2. Since the answers are in slope intercept form, find the *y*-intercept: $y=mx+b$

$3=-2(7)+b$

$17=b$

PTS: 2 REF: 081010ge TOP: Parallel and Perpendicular Lines

111 ANS:



PTS: 2 REF: 080932ge TOP: Constructions

112 ANS: 1

$3x^2 + 18x + 24$

$3(x^2 + 6x + 8)$

$3(x + 4)(x + 2)$

PTS: 2 REF: fall0815ge TOP: Volume

113 ANS:

$2\sqrt{3}$. $x^2 = 3 \cdot 4$

$x = \sqrt{12} = 2\sqrt{3}$

PTS: 2 REF: fall0829ge TOP: Similarity KEY: altitude

114 ANS: 1

$-2\left(-\frac{1}{2}y = 6x + 10\right)$

$y = -12x - 20$

PTS: 2 REF: 061027ge TOP: Parallel and Perpendicular Lines

115 ANS: 4

The slope of $y = -3x + 2$ is -3. The perpendicular slope is $\frac{1}{3}$. $-1 = \frac{1}{3}(3) + b$

$-1 = 1 + b$

$b = -2$

PTS: 2 REF: 011018ge TOP: Parallel and Perpendicular Lines

116 ANS: 1 PTS: 2 REF: 060918ge TOP: Planes

117 ANS:

$y = -2x + 14$. The slope of $2x + y = 3$ is $\frac{-A}{B} = \frac{-2}{1} = -2$. $y = mx + b$.

$4 = (-2)(5) + b$

$b = 14$

PTS: 2 REF: 060931ge TOP: Parallel and Perpendicular Lines

118 ANS: 3

$$(x+3)^2 - 4 = 2x + 5$$

$$x^2 + 6x + 9 - 4 = 2x + 5$$

$$x^2 + 4x = 0$$

$$x(x+4) = 0$$

$$x = 0, -4$$

PTS: 2 REF: 081004ge TOP: Quadratic-Linear Systems

119 ANS: 3

$$4(x+4) = 8^2$$

$$4x + 16 = 64$$

$$x = 12$$

PTS: 2 REF: 060916ge TOP: Segments Intercepted by Circle
KEY: tangent and secant

120 ANS:

70. $3x + 5 + 3x + 5 + 2x + 2x = 180$

$$10x + 10 = 360$$

$$10x = 350$$

$$x = 35$$

$$2x = 70$$

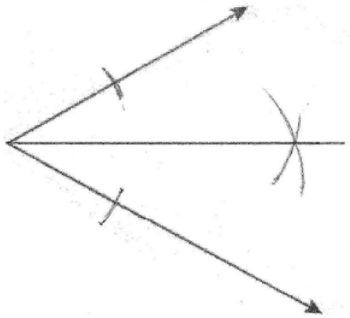
PTS: 2 REF: 081029ge TOP: Trapezoids

121 ANS: 4

$M_x = \frac{-6+1}{2} = -\frac{5}{2}$. $M_y = \frac{1+8}{2} = \frac{9}{2}$.

PTS: 2 REF: 060919ge TOP: Midpoint

122 ANS:



PTS: 2 REF: fall0832ge TOP: Constructions

123 ANS:
110. $6x + 20 = x + 40 + 4x - 5$

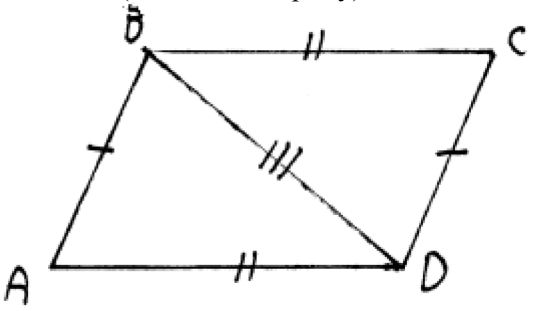
$6x + 20 = 5x + 35$

$x = 15$

$6((15) + 20 = 110$

PTS: 2 REF: 081031ge TOP: Isosceles Triangle Theorem

124 ANS:
$\overline{BD} \cong \overline{DB}$ (Reflexive Property); $\triangle ABD \cong \triangle CDB$ (SSS); $\angle BDC \cong \angle ABD$ (CPCTC).



PTS: 4 REF: 061035ge TOP: Quadrilateral Proofs

125 ANS: 1
Since $\overline{AC} \cong \overline{BC}$, $m\angle A = m\angle B$ under the Isosceles Triangle Theorem.

PTS: 2 REF: fall0809ge TOP: Triangles in the Coordinate Plane

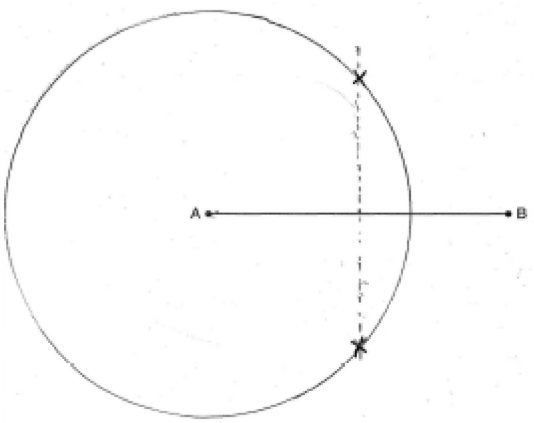
126 ANS: 3
$m = \frac{-A}{B} = -\frac{3}{4}$

PTS: 2 REF: 011025ge TOP: Parallel and Perpendicular Lines

127 ANS: 4
$\overline{BG}$ is also an angle bisector since it intersects the concurrence of $\overline{CD}$ and $\overline{AE}$

PTS: 2 REF: 061025ge KEY: Centroid, Orthocenter, Incenter and Circumcenter

128 ANS:



PTS: 2 REF: 060932ge TOP: Locus

129 ANS:

37. Since $\overline{DE}$ is a midsegment, $AC = 14$. $10 + 13 + 14 = 37$

PTS: 2 REF: 061030ge TOP: Midsegments

130 ANS:

18. $V = \frac{1}{3}Bh = \frac{1}{3}lwh$

$288 = \frac{1}{3} \cdot 8 \cdot 6 \cdot h$

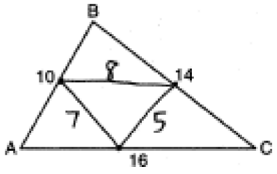
$288 = 16h$

$18 = h$

PTS: 2 REF: 061034ge TOP: Volume

131 ANS:

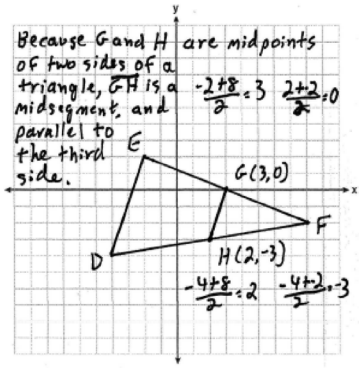
20. The sides of the triangle formed by connecting the midpoints are half the sides of the original triangle.

$5 + 7 + 8 = 20$. 

PTS: 2 REF: 060929ge TOP: Midsegments

132 ANS: 4 PTS: 2 REF: 061003ge TOP: Solids

133 ANS:



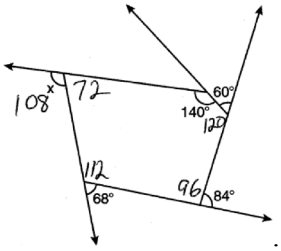
PTS: 4 REF: fall0835ge TOP: Midsegments

134 ANS: 1

The closer a chord is to the center of a circle, the longer the chord.

PTS: 2 REF: 011005ge TOP: Chords

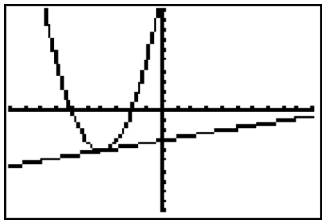
135 ANS: 3



. The sum of the interior angles of a pentagon is $(5-2)180 = 540$.

PTS: 2 REF: 011023ge TOP: Interior and Exterior Angles of Polygons

136 ANS: 3



PTS: 2 REF: 061011ge TOP: Quadratic-Linear Systems

137 ANS: 1

Opposite sides of a parallelogram are congruent. $4x-3=x+3$. $SV=(2)+3=5$.

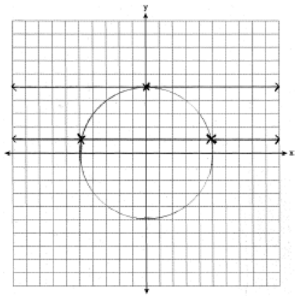
$$3x=6$$

$$x=2$$

PTS: 2 REF: 011013ge TOP: Parallelograms

138 ANS: 2 PTS: 2 REF: 011006ge TOP: Isometries

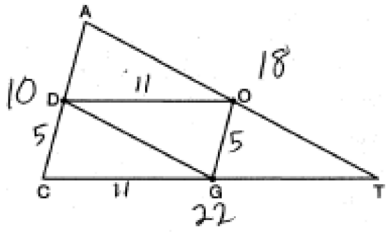
139 ANS:



PTS: 4 REF: 080936ge TOP: Locus

140 ANS: 1 PTS: 2 REF: 061005ge TOP: Properties of Transformations

141 ANS: 3



PTS: 2 REF: 080920ge TOP: Midsegments

142 ANS:

$y = \frac{2}{3}x + 1$. $2y + 3x = 6$. $y = mx + b$

$2y = -3x + 6$ $5 = \frac{2}{3}(6) + b$

$y = -\frac{3}{2}x + 3$ $5 = 4 + b$

$m = -\frac{3}{2}$ $1 = b$

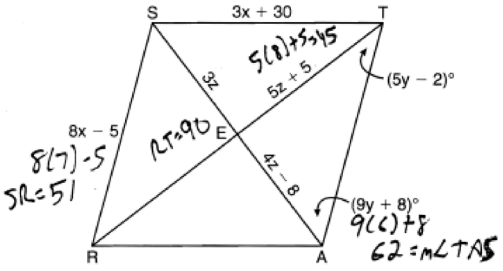
$y = \frac{2}{3}x + 1$

$m_{\perp} = \frac{2}{3}$

PTS: 4 REF: 061036ge TOP: Parallel and Perpendicular Lines

143 ANS: 2 PTS: 2 REF: 061022ge TOP: Parallel and Perpendicular Lines

144 ANS:



$8x-5=3x+30.\quad 4z-8=3z.\quad 9y+8+5y-2=90.$

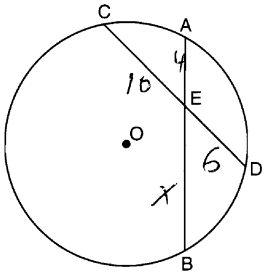
$5x=35 \qquad z=8 \qquad 14y+6=90$

$x=7 \qquad\qquad 14y=84$

$y=6$

PTS: 6 REF: 061038ge TOP: Special Parallelograms

145 ANS: 1



$4x=6\cdot 10$

$x=15$

PTS: 2 REF: 081017ge TOP: Segments Intercepted by Circle
KEY: two chords

146 ANS: 4 PTS: 2 REF: 060922ge TOP: Equations of Circles

147 ANS: 2 PTS: 2 REF: fall0806ge TOP: Planes

148 ANS: 3

The slope of $y=x+2$ is 1. The slope of $y-x=-1$ is $\frac{-A}{B}=\frac{-(-1)}{1}=1.$

PTS: 2 REF: 080909ge TOP: Parallel and Perpendicular Lines

149 ANS:

22.4. $V=\pi r^2 h$

$12566.4=\pi r^2\cdot 8$

$r^2=\frac{12566.4}{8\pi}$

$r\approx 22.4$

PTS: 2 REF: fall0833ge TOP: Volume

150 ANS: 3 PTS: 2 REF: 061004ge TOP: Isosceles Triangle Theorem

151 ANS:

(6,–4). $C_x = \frac{Q_x + R_x}{2}$. $C_y = \frac{Q_y + R_y}{2}$.

$3.5 = \frac{1 + R_x}{2}$ $\quad$ $2 = \frac{8 + R_y}{2}$

$7 = 1 + R_x$ $\quad$ $4 = 8 + R_y$

$6 = R_x$ $\quad$ $-4 = R_y$

PTS: 2 REF: 011031ge TOP: Midpoint

152 ANS: 2

The slope of $y = \frac{1}{2}x + 5$ is $\frac{1}{2}$. The slope of a perpendicular line is –2. $y = mx + b$.

$5 = (-2)(-2) + b$

$b = 1$

PTS: 2 REF: 060907ge TOP: Parallel and Perpendicular Lines

153 ANS: 3

$V = \pi r^2 h = \pi \cdot 6^2 \cdot 27 = 972\pi$

PTS: 2 REF: 011027ge TOP: Volume

154 ANS:

5. $\frac{3}{x} = \frac{6+3}{15}$

$9x = 45$

$x = 5$

PTS: 2 REF: 011033ge TOP: Side Splitter Theorem

155 ANS: 3 PTS: 2 REF: 060925ge TOP: Constructions

156 ANS:

3. The non-parallel sides of an isosceles trapezoid are congruent. $2x + 5 = 3x + 2$

$x = 3$

PTS: 2 REF: 080929ge TOP: Trapezoids

157 ANS:

$\angle D$, $\angle G$ and 24° or $\angle E$, $\angle F$ and 84°. $\text{m}\overset{\frown}{FE} = \frac{2}{15} \times 360 = 48$. Since the chords forming $\angle D$ and $\angle G$ are intercepted by $\overset{\frown}{FE}$, their measure is 24°. $\text{m}\overset{\frown}{GD} = \frac{7}{15} \times 360 = 168$. Since the chords forming $\angle E$ and $\angle F$ are intercepted by $\overset{\frown}{GD}$, their measure is 84°.

PTS: 4 REF: fall0836ge TOP: Arcs Determined by Angles

KEY: inscribed

158 ANS: 1

$a^2 + (5\sqrt{2})^2 = (2\sqrt{15})^2$

$a^2 + (25 \times 2) = 4 \times 15$

$a^2 + 50 = 60$

$a^2 = 10$

$a = \sqrt{10}$

PTS: 2 REF: 011016ge TOP: Pythagorean Theorem

159 ANS: 1 PTS: 2 REF: 080918ge TOP: Special Quadrilaterals

160 ANS: 4 PTS: 2 REF: 080905ge TOP: Triangle Congruency

161 ANS: 1 PTS: 2 REF: 011024ge TOP: Planes

162 ANS: 3

$2y = -6x + 8$ Perpendicular lines have slope the opposite and reciprocal of each other.

$y = -3x + 4$

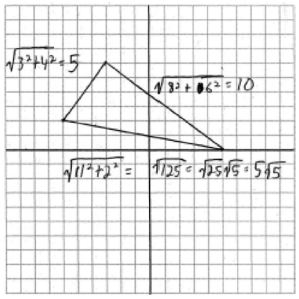
$m = -3$

$m_{\perp} = \frac{1}{3}$

PTS: 2 REF: 081024ge TOP: Parallel and Perpendicular Lines

163 ANS: 2 PTS: 2 REF: 061020ge TOP: Constructions

164 ANS:



$15 + 5\sqrt{5}$.

PTS: 4 REF: 060936ge TOP: Triangles in the Coordinate Plane

165 ANS: 2 PTS: 2 REF: 011003ge TOP: Properties of Transformations

166 ANS: 4

$(n-2)180 = (8-2)180 = 1080.$ $\frac{1080}{8} = 135.$

PTS: 2 REF: fall0827ge TOP: Interior and Exterior Angles of Polygons

167 ANS: 2

The length of the midsegment of a trapezoid is the average of the lengths of its bases. $\frac{x+30}{2}=44.$

$$x+30=88$$

$$x=58$$

PTS: 2 REF: 011001ge TOP: Trapezoids

168 ANS: 2

Adjacent sides of a rectangle are perpendicular and have opposite and reciprocal slopes.

PTS: 2 REF: 061028ge TOP: Quadrilaterals in the Coordinate Plane

169 ANS: 2

$(d+4)4=12(6)$

$4d+16=72$

$d=14$

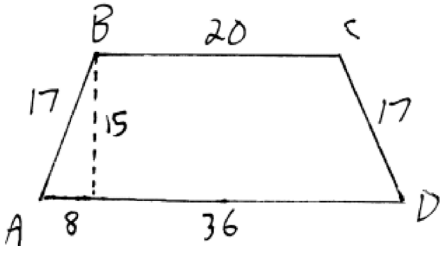
$r=7$

PTS: 2 REF: 061023ge TOP: Segments Intercepted by Circle

KEY: two secants

170 ANS: 2 PTS: 2 REF: 011020ge TOP: Graphing Circles

171 ANS: 3



$\frac{36-20}{2}=8.$ $\sqrt{17^2-8^2}=15$

PTS: 2 REF: 061016ge TOP: Trapezoids

172 ANS: 2

A dilation affects distance, not angle measure.

PTS: 2 REF: 080906ge TOP: Identifying Transformations

173 ANS: 2 PTS: 2 REF: 061007ge TOP: Parallel Lines and Transversals

174 ANS: 3

Because $\overline{OC}$ is a radius, its length is 5. Since $CE=2$ $OE=3.$ $\triangle EDO$ is a 3-4-5 triangle. If $ED=4$, $BD=8.$

PTS: 2 REF: fall0811ge TOP: Chords

175 ANS:

67. $\frac{180-46}{2}=67$

PTS: 2 REF: 011029ge TOP: Isosceles Triangle Theorem

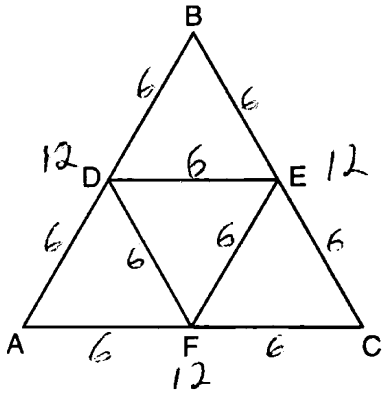
176 ANS: 4 PTS: 2 REF: 060912ge TOP: Locus
177 ANS: 3 PTS: 2 REF: 080913ge TOP: Triangle Congruency
178 ANS: 3 PTS: 2 REF: fall0825ge
TOP: Centroid, Orthocenter, Incenter and Circumcenter
179 ANS: 4
The radius is 4. $r^2 = 16$.

PTS: 2 REF: 061014ge TOP: Equations of Circles
180 ANS: 4
$x^2 = (4+5) \times 4$

$x^2 = 36$

$x = 6$

PTS: 2 REF: 011008ge TOP: Segments Intercepted by Circle
KEY: tangent and secant
181 ANS: 1



PTS: 2 REF: 081003ge TOP: Midsegments
182 ANS: 2
$y + \frac{1}{2}x = 4 \quad 3x + 6y = 12$

$6y = -3x + 12$

$y = -\frac{1}{2}x + 4$

$y = -\frac{3}{6}x + 2$

$m = -\frac{1}{2}$

$y = -\frac{1}{2}x + 2$

PTS: 2 REF: 081014ge TOP: Parallel and Perpendicular Lines
183 ANS: 4
$180 - (50 + 30) = 100$

PTS: 2 REF: 081006ge TOP: Similarity KEY: basic
184 ANS: 1 PTS: 2 REF: 081012ge TOP: Tangents
KEY: two tangents

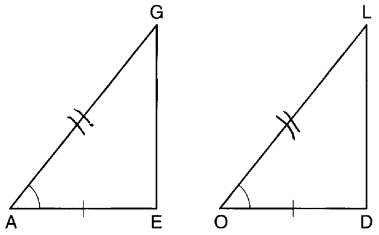
185 ANS: 1

$\overline{AB} = 10$ since $\triangle ABC$ is a 6-8-10 triangle. $6^2 = 10x$

$3.6 = x$

PTS: 2 REF: 060915ge TOP: Similarity KEY: leg

186 ANS: 2



PTS: 2 REF: 081007ge TOP: Triangle Congruency

187 ANS:

2.4. $5a = 4^2$ $5b = 3^2$ $h^2 = ab$

$a = 3.2$ $b = 1.8$ $h^2 = 3.2 \cdot 1.8$

$h = \sqrt{5.76} = 2.4$

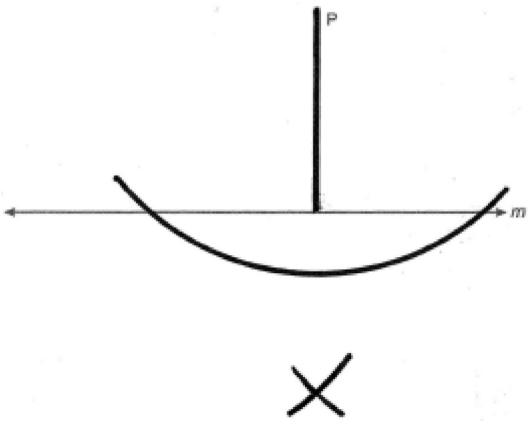
PTS: 4 REF: 081037ge TOP: Similarity KEY: altitude

188 ANS:

Because $\overline{AB} \parallel \overline{DC}$, $\overset{\frown}{AD} \cong \overset{\frown}{BC}$ since parallel chords intersect congruent arcs. $\angle BDC \cong \angle ACD$ because inscribed angles that intercept congruent arcs are congruent. $\overline{AD} \cong \overline{BC}$ since congruent chords intersect congruent arcs. $\overline{DC} \cong \overline{CD}$ because of the reflexive property. Therefore, $\triangle ACD \cong \triangle BDC$ because of SAS.

PTS: 6 REF: fall0838ge TOP: Circle Proofs

189 ANS:



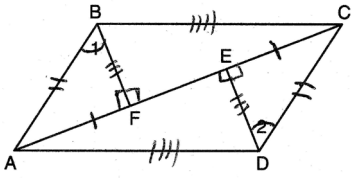
PTS: 2 REF: 060930ge TOP: Constructions

190 ANS:
18. If the ratio of *TA* to *AC* is 1:3, the ratio of *TE* to *ES* is also 1:3. $x + 3x = 24$. $3(6) = 18$.

$$x = 6$$

PTS: 4 REF: 060935ge TOP: Tangents KEY: common tangency
191 ANS: 4 PTS: 2 REF: 081023ge TOP: Similarity
KEY: perimeter and area
192 ANS: 4 PTS: 2 REF: 060904ge TOP: Solids
193 ANS: 3 PTS: 2 REF: 080928ge TOP: Tangents
KEY: common tangency
194 ANS: 3 PTS: 2 REF: 061017ge TOP: Planes
195 ANS:
2016. $V = \frac{1}{3}Bh = \frac{1}{3}s^2h = \frac{1}{3}12^2 \cdot 42 = 2016$

PTS: 2 REF: 080930ge TOP: Volume
196 ANS: 2 PTS: 2 REF: 011004ge TOP: Constructions
197 ANS: 4 PTS: 2 REF: 061018ge TOP: Identifying Transformations
198 ANS: 4 PTS: 2 REF: fall0824ge TOP: Tangents
KEY: common tangency
199 ANS: 4 PTS: 2 REF: 080915ge TOP: Identifying Transformations
200 ANS: 2 PTS: 2 REF: 060910ge TOP: Equations of Circles
201 ANS:



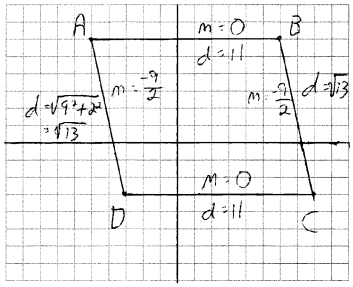
$\overline{FE} \cong \overline{FE}$ (Reflexive Property); $\overline{AE} - \overline{FE} \cong \overline{FC} - \overline{EF}$ (Line Segment Subtraction Theorem); $\overline{AF} \cong \overline{CE}$ (Substitution); $\angle BFA \cong \angle DEC$ (All right angles are congruent); $\triangle BFA \cong \triangle DEC$ (AAS); $\overline{AB} \cong \overline{CD}$ and $\overline{BF} \cong \overline{DE}$ (CPCTC); $\angle BFC \cong \angle DEA$ (All right angles are congruent); $\triangle BFC \cong \triangle DEA$ (SAS); $\overline{AD} \cong \overline{CB}$ (CPCTC); *ABCD* is a parallelogram (opposite sides of quadrilateral *ABCD* are congruent)

PTS: 6 REF: 080938ge TOP: Special Quadrilaterals
202 ANS: 3 PTS: 2 REF: 081021ge TOP: Properties of Transformations
203 ANS:
36, because a dilation does not affect angle measure. 10, because a dilation does affect distance.

PTS: 4 REF: 011035ge TOP: Properties of Transformations
204 ANS: 2
$6 + 17 > 22$

PTS: 2 REF: 080916ge TOP: Triangle Inequality Theorem
205 ANS: 3 PTS: 2 REF: 080902ge TOP: Constructions

206 ANS:



$\overline{AB} \| \overline{CD}$ and $\overline{AD} \| \overline{CB}$ because their slopes are equal. $ABCD$ is a parallelogram because opposite side are parallel. $\overline{AB} \neq \overline{BC}$. $ABCD$ is not a rhombus because all sides are not equal. $\overline{AB} \sim \perp \overline{BC}$ because their slopes are not opposite reciprocals. $ABCD$ is not a rectangle because $\angle ABC$ is not a right angle.

PTS: 4 REF: 081038ge TOP: Quadrilaterals in the Coordinate Plane

207 ANS: 2

The centroid divides each median into segments whose lengths are in the ratio 2 : 1.

PTS: 2 REF: 060914ge TOP: Centroid

208 ANS: 1

In an equilateral triangle, each interior angle is 60° and each exterior angle is 120° (180° - 120°). The sum of the three interior angles is 180° and the sum of the three exterior angles is 360°.

PTS: 2 REF: 060909ge TOP: Interior and Exterior Angles of Triangles

209 ANS: 2

$$\frac{87+35}{2} = \frac{122}{2} = 61$$

PTS: 2 REF: 011015ge TOP: Arcs Determined by Angles
KEY: inside circle

210 ANS: 2

$$\frac{140-\overline{RS}}{2} = 40$$

$$140-\overline{RS} = 80$$

$$\overline{RS} = 60$$

PTS: 2 REF: 081025ge TOP: Arcs Determined by Angles
KEY: outside circle

211 ANS: 4

$$d = \sqrt{(-3-1)^2+(2-0)^2} = \sqrt{16+4} = \sqrt{20} = \sqrt{4}\cdot\sqrt{5} = 2\sqrt{5}$$

PTS: 2 REF: 011017ge TOP: Distance

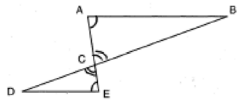
212 ANS: 4

(4) is not true if $\angle PQR$ is obtuse.

PTS: 2 REF: 060924ge TOP: Exterior Angle Theorem

213 ANS: 2
$7+18>6+12$

PTS: 2 REF: fall0819ge TOP: Triangle Inequality Theorem
214 ANS: 3 PTS: 2 REF: 080924ge TOP: Negations
215 ANS: 1 PTS: 2 REF: 081008ge TOP: Planes
216 ANS: 1 PTS: 2 REF: 081009ge TOP: Equations of Circles
217 ANS: 3 PTS: 2 REF: 060908ge TOP: Identifying Transformations
218 ANS: 2

$\angle ACB$ and $\angle ECD$ are congruent vertical angles and $\angle CAB \cong \angle CED$. 

PTS: 2 REF: 060917ge TOP: Similarity Proofs
219 ANS: 1 PTS: 2 REF: 061010ge TOP: Angle Side Relationship
220 ANS:

Midpoint: $\left(\frac{-4+4}{2}, \frac{2+(-4)}{2}\right) = (0,-1)$. Distance: $d = \sqrt{(-4-4)^2+(2-(-4))^2} = \sqrt{100} = 10$

$r = 5$

$r^2 = 25$

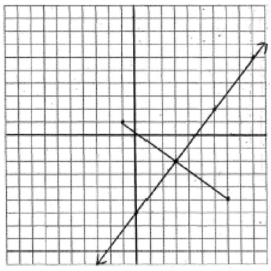
$x^2 + (y+1)^2 = 25$

PTS: 2 REF: 061037ge TOP: Equations of Circles
221 ANS:

$y = \frac{4}{3}x - 6$. $M_x = \frac{-1+7}{2} = 3$ The perpendicular bisector goes through $(3,-2)$ and has a slope of $\frac{4}{3}$.

$M_y = \frac{1+(-5)}{2} = -2$

$m = \frac{1-(-5)}{-1-7} = -\frac{3}{4}$



$y - y_M = m(x - x_M)$.

$y - 1 = \frac{4}{3}(x-2)$

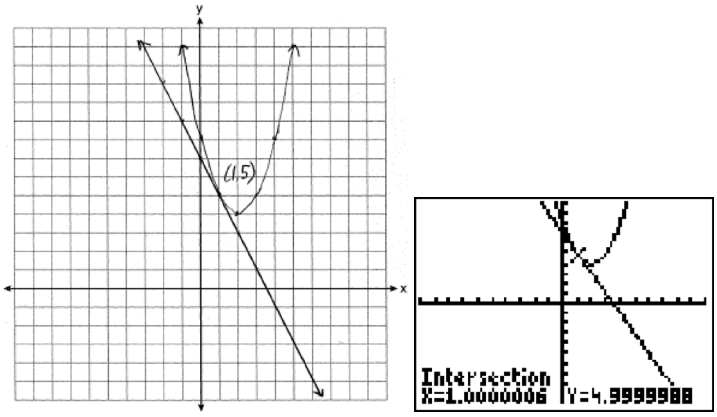
PTS: 4 REF: 080935ge TOP: Perpendicular Bisector

222 ANS:

$(x+1)^2+(y-2)^2=36$

PTS: 2 REF: 081034ge TOP: Equations of Circles

223 ANS:



PTS: 6 REF: 011038ge TOP: Quadratic-Linear Systems

224 ANS: 4

$d=\sqrt{(-6-2)^2+(4-(-5))^2}=\sqrt{64+81}=\sqrt{145}$

PTS: 2 REF: 081013ge TOP: Distance

225 ANS: 4

sum of interior $\angle$s = sum of exterior $\angle$s

$$(n-2)180=n\left(180-\frac{(n-2)180}{n}\right)$$

$$180n-360=180n-180n+360$$

$$180n=720$$

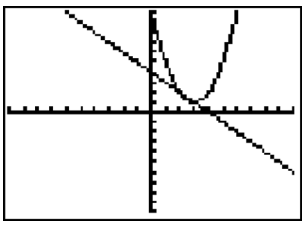
$$n=4$$

PTS: 2 REF: 081016ge TOP: Interior and Exterior Angles of Polygons

226 ANS: 4 PTS: 2 REF: 011012ge TOP: Planes

227 ANS: 2 PTS: 2 REF: 080921ge TOP: Equations of Circles

228 ANS: 4



$y + x = 4$. $x^2 - 6x + 10 = -x + 4$. $y + x = 4$. $y + 2 = 4$

$y = -x + 4$ $x^2 - 5x + 6 = 0$ $y + 3 = 4$ $y = 2$

$(x - 3)(x - 2) = 0$ $y = 1$

$x = 3$ or 2

PTS: 2 REF: 080912ge TOP: Quadratic-Linear Systems