Summer Packet for AICE Math

Let's split this up into two perspectives

1. Don't Panic

This is not an assignment that is due at the end of summer. You don't need to turn in your work on the first day of class. This is a collection of topics that I think is fair to expect that you are familiar with, and if you have forgotten some of these strategies, this packet serves as a source of practice. You do not need to complete all the questions. Maybe you feel competent in some or all this material. I tried to give enough questions so that you could stretch your legs in these areas. If you want *more* practice, you can reach out to me (thomas.miska@stjohns.k12.fl.us) and I will provide you with additional questions.

2. Panic (a little)

We don't have time for me to reteach these concepts for weeks. I know that these points have been discussed in your algebra and geometry classes. As an advanced student, you do not have permission to forget all of the skills that you have been working on for the last few years. AICE math needs a good foundation of competency to get off on the right foot, and this packet represents content that I expect you to feel comfortable with on the first day. I will be checking for understanding. The first grade for quarter 1 will be a 30-minute formative assessment with 15 questions based on these skills. This assessment will be given on the first Friday of the school year: 08/14/2026

There is a brief passage that accompanies each topic, and a corresponding example. The question set is split into two parts, so the question numbers reset. If you want a snip of advice, I would not attempt to review this packet in one night.

Enjoy your summer. Be a kid. Take a break. *But remember what you signed up for.*

Sincerely,

-Miska

A scientific calculator is required for the course. Any scientific calculator will do, but a Casio fx-115ES PLUS is strongly recommended. They are around 20 dollars.

<u>A GRAPHING CALCULATOR IS NOT ALLOWED.</u>

Much of the computational work can, and will, be done by hand. A calculator is always permitted though, and it is put to use for everything from menial tasks to necessary calculations. Students that do not have a calculator on test days or for scored classwork will simply need to make do without one. This year, to encourage students to have their own device, calculators will not be provided. Every machine has its own quirks so the sooner this, or a comparable, calculator is acquired, the better.

Descriptions of the examples for Part 1

LINES (Linear concepts)

#1. Linear concepts are throughout the coursework. You must be able to write equations of lines in all three forms: slope intercept, point slope and standard form. How you arrive at this formatting is a matter of preference, but Miska will always start with point slope form in lecture and worked examples.

#2. Understanding the rule for perpendicular slopes (and less often, parallel slopes) is a fundamental requirement of the class. The product of perpendicular slopes is -1. We learn this in algebra as "the slopes of perpendicular lines are negative reciprocals".

#3. Linear systems are throughout the coursework. You can solve these with either substitution or elimination. It's your preference, but you are encouraged to be proficient in both strategies. In Algebra 2 the goal is typically to find a point of intersection, which is what the practice is emphasizing. In AICE math we usually use these strategies to find values of two unknowns given two linear equations.

PARABOLAS (Quadratic concepts)

#4. Completing the square is a required skill. Converting to from standard form of quadratics to vertex form is a consistent expectation across multiple chapters in the book. There are variations of the technique taught and available to peruse online. Your style is your preference. All that is necessary is that your technique has a 100% success rate.

#5. There are some fundamental function shapes that students are expected to remember. The parabola is one of them. It is one of the most practiced function patterns, occurring in Alg1 and Alg2. You should be able to use symmetry and minimal calculations to find sketch the general shape of a parabolic curve. The vertex is a critical point and regularly referenced.

FACTORING (Focus on Quadratic Factoring)

#6-#11 Any kind of factoring with highest power of two is on the menu. The expectation is that no question of this type is an issue on day one. It is important to consider that you are not truly proficient in factoring unless you can be successful when the leading coefficient is not 1 AND it cannot be factored out of the expression. That's what this course considers "real factoring".

#12 Quadratic form or "hidden quadratics" occur across multiple sections in the book. These circumstances are easily recognizable with practice. They are normally trinomials and the highest powers are always double the middle power. This is a polynomial equation solving technique from Alg2.

#13 Non-linear systems. In these questions we are only looking for points of intersection(s) between a line and a curve. Only substitution is used in these questions. If we are asked to find intersection points, then they ALWAYS exist.

TRIGONOMETRIC CONCEPTS

#14 and #15 You should be able to use sine, cosine, and tangent in right triangle diagrams to find missing angles or side lengths. This skill is used when we have angles and are finding sides, and when we have sides and are looking for angles. Be able to do both. "The sum of the interior angles in a triangle = 180" and "the hypotenuse is across from the right angle" are essential truths necessary to work these problems. Questions of this nature require a calculator.

Descriptions of the examples for Part 2

SPECIAL RIGHT TRIANGLES

#1 and #2 We are regularly put in a position where the special right triangle rules are either a great help to make calculations easier, or absolutely necessary to answer the question. Special right triangles are the core of the Unit Circle. Memorize these side relationships.

PYTHAGOREAN THEOREM

#3 and #4 The most important part of Pythagorean theorem, which you have been using since middle school, is that "c" is always the hypotenuse. We typically leave our answers as simplified radicals. A good calculator will do the simplifying step for you.

DISTANCE AND MIDPOINT

#5 and #6 These are basic tools from geometry. You must memorize the formulas.

EQUATION OF A CIRCLE

#7 There are several ways to express a circle in notation. The most useful for us is $(x-h)^2+(y-k)^2=r^2$. Where (h,k) is the center and r is the radius. The given equations can be written in this format by completing the square. For this task, feel free to move all constants not belonging to the perfect square trinomials to the opposite side of the equal sign.

THE UNIT CIRCLE

The unit circle is a diagram that is used to illustrate core concepts for trigonometry. You will be expected to reproduce it early on in the first quarter. A blank unit circle will be on the first quiz of the year. You do not have to understand the circle to memorize it and there are countless tricks and techniques to remember all the elements of the diagram. We will use this information for numerous questions and AICE rewards us for being fluent with the concept. It is recommended that you are able to fill it out on the first day of class. A complete image and a blank copy are included in the packet.

PART 1 EX

Write the slope-intercept, point slope, or standard form of the equation of the line through the given points.

1) through: $(-1, -5)$ and $(2, 2)$

$x_1 \; y_1 \quad x_2 \; y_2$

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2+5}{2+1} = \frac{7}{3}$

$y + 5 = \frac{7}{3}(x + 1)$ POINT SLOPE

$y + 5 = \frac{7}{3}x + \frac{7}{3}$

$y = \frac{7}{3}x + \frac{7}{3} - \frac{15}{3}$

$y = \frac{7}{3}x - \frac{8}{3}$ SLOPE INTERCEPT

$-\frac{7}{3}x + y = -\frac{8}{3}$

$7x - 3y = 8$ STANDARD FORM

Write the point-slope form of the equation of the line described.

2) through: $(-2, -3)$, perp. to $y = -\frac{2}{3}x + 4$

PERPENDICULAR TO THIS LINE.
SLOPE IS THE NEGATIVE RECIPROCAL.

$m = \frac{3}{2}$

$y + 3 = \frac{3}{2}(x + 2)$

PART 1 EX

Find the point of intersection for each linear system. Use either substitution or elimination. If you want to be the GOAT, do each question with substitution AND with elimination.

3) $63 - 9y + 13x = 0$
$-18 = -4x + 9y$

SUBSTITUTION

$-18 + 4x = 9y$

$63 - (-18 + 4x) + 13x = 0$

$63 + 18 - 4x + 13x = 0$

$81 + 9x = 0$

$9x = -81$

$x = -9$

$-18 = -4(-9) + 9y$

$-18 = 36 + 9y$

$-54 = 9y$

$-6 = y$

$(-9, -6)$

ELIMINATION

$63 - 9y + 13x = 0$

$-(-18 - 9y + 4x = 0)$

$81 + 0 + 9x = 0$

$9x = -81$

Complete the square to write the vertex form equation of each parabola. $y = a(x-h)^2 + k$

4) $y = -2x^2 - 36x - 158$

$y = -2(x^2 + 18x \_\_\_) - 158 \_\_\_$

$y = -2(x^2 + 18x + 81) - 158 + 168$

$y = -2(x+9)^2 + 4$

PART 1 EX

Identify the min/max value and y-intercept of each. Then sketch the graph.

5) $y = 2x^2 + 8x + 3$

OPENS UP. Y-VALUE OF VERTEX IS MIN.

Y-INTERCEPT IS 3. → (0, 3)

$y = 2(x^2 + 4x \_\_) + 3 \_\_$

$y = 2(x^2 + 4x \underline{+4}) + 3 \underline{-8}$

$y = 2(x + 2)^2 - 5$

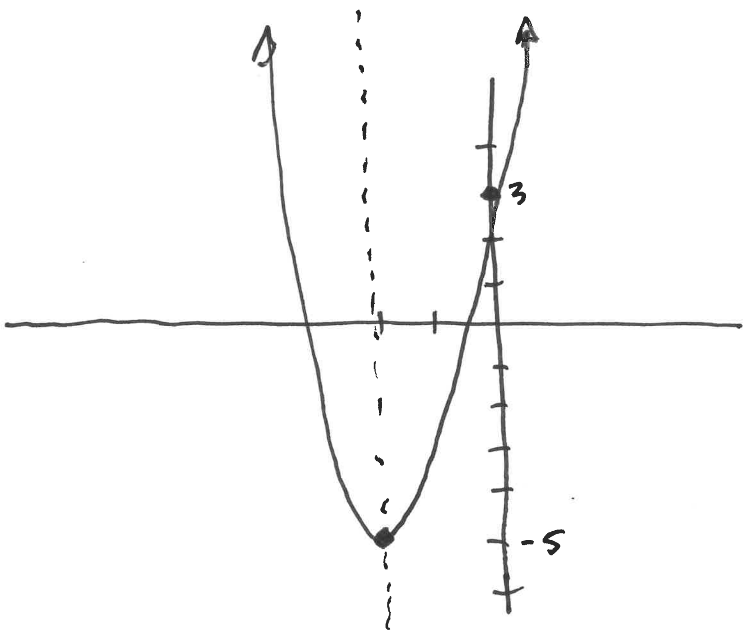
ROOT OF THIS EXPRESSION

EXACTLY THIS VALUE

$y = -5$.

$x = -2$ → VERTEX $(-2, -5)$

-5 IS THE MIN



PART 1 EX

Factor each completely. "GCF"

6) $5x^2 - 9x$

$\frac{5x^2}{x} - \frac{9x}{x}$

$x(5x - 9)$

Factor each completely. "Traditional Quadratics"

7) $x^2 - 15x + 54$ REALLY EASY

$(x-9)(x-6)$

8) $4x^2 + 4x - 120$ HIDDEN EASY

$4(x^2 + x - 30)$

$4(x+6)(x-5)$

9) $40m^2 + 4m - 84$ REAL FACTORING

$4(10m^2 + m - 21)$

$4(10m^2 - 14m + 15m - 21)$

$4(2m(5m-7) + 3(5m-7))$

$4(2m+3)(5m-7)$

Factor each completely. "Special Case Quadratics: Difference of Squares and Perfect Square Trinomials"

10) $27n^2 + 72n + 48$

$3(9n^2 + 24n + 16)$

$3(3n+4)^2$

11) $16n^2 - 9$

$(4n-3)(4n+3)$

Factor each completely. "Quadratic Form"

12) $15m^4 + 55m^2 - 210$

$5(3m^4 + 11m^2 - 42)$

$5(3m^4 - 7m^2 + 18m^2 - 42)$

$5(m^2(3m^2 - 7) + 6(3m^2 - 7))$

$5(m^2+6)(3m^2-7)$

Find the point(s) of intersection for each non-linear system. We only encounter this system type with one linear equation and one quadratic equation, so substitution is the required technique.

13) $x^2 + 6y^2 - 51x + y + 6 = 0$
$x + y + 2 = 0$

$x = -2 - y$

$(-2-y)^2 + 6y^2 - 51(-2-y) + y + 6 = 0$

$4 + 4y + y^2 + 6y^2 + 102 + 51y + y + 6 = 0$

$7y^2 + 56y + 112 = 0$

$y^2 + 8y + 16 = 0$

$(y+4)^2 = 0$

$y = -4$

$x + (-4) + 2 = 0$

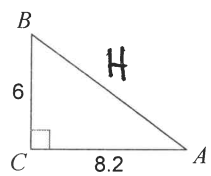
$x - 2 = 0$

$x = 2$

$(2, -4)$

Find the measure of all missing sides and angles. Use right triangle trigonometry (SOH-CAH-TOA) Round answers to the nearest tenth.

14)



$\sin A = \frac{6}{H}$ ☹

$\tan A = \frac{6}{8.1}$

$\tan^{-1}\left(\frac{6}{8.1}\right) = A$

$A \approx 36.5°$

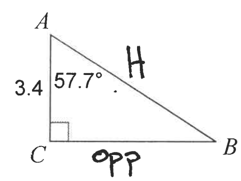
$B = 180 - 90 - 36.5$

$B = 53.5°$

$6^2 + 8.2^2 = H^2$

$10.2 = H$

15)



$\sin A = \frac{opp}{Hyp}$ ☹

$\cos A = \frac{3.4}{H}$

$\cos 57.7 = \frac{3.4}{H}$

$H = \frac{3.4}{\cos 57.7}$

$H \approx 6.4$

$(opp)^2 + 3.4^2 = 6.4^2$

$(opp)^2 = 29.4$

$opp = 5.4$

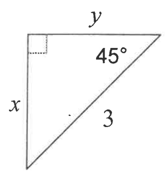
$B = 180 - 90 - 57.7$

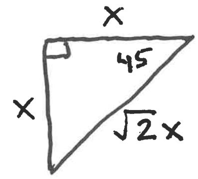
$B = 32.3°$

PART 2 EX

Use special right triangle side relationships to find the missing side lengths. Leave your answers as radicals in simplest form.

1)





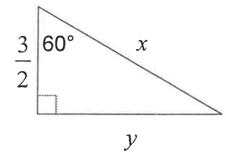
$x = y$

$\sqrt{2}x = 3$

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

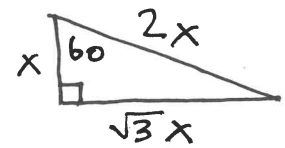
$x = \frac{3\sqrt{2}}{2} = y$

2)



$x = 3$

$y = \frac{3\sqrt{3}}{2}$



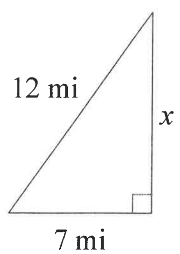
$x = \frac{3}{2}$

$2x = 3$

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

Use the Pythagorean Theorem to find the missing side of each triangle. Leave your answers in simplest radical form.

3)



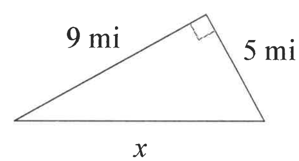
$7^2 + x^2 = 12^2$

$49 + x^2 = 144$

$x^2 = 95$

$x = \sqrt{95}$

4)



$9^2 + 5^2 = x^2$

$81 + 25 = x^2$

$106 = x^2$

$\sqrt{106} = x$

PART 2 EX

Find the distance between each pair of points.

5) (−6, 6), (−2, −8)

$x_1\ y_1\quad x_2\ y_2$

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

$d = \sqrt{(-2+6)^2 + (-8-6)^2}$

$d = \sqrt{(4)^2 + (-14)^2}$

$d = \sqrt{212} = 2\sqrt{53}$

Find the midpoint of the line segment with the given endpoints.

6) (−3, 8), (−8, 10)

$x_1\ y_1\quad x_2\ y_2$

$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

$\left(\frac{-3 - 8}{2}, \frac{8 + 10}{2}\right)$

$\left(\frac{-11}{2}, 9\right)$

Complete the square to identify the center and radius of each circle

7) $0 = -x^2 + 22y - 196 - 20x - y^2$

$x^2 + 20x + 100 + y^2 - 22y + 121 = -196 + 100 + 121$

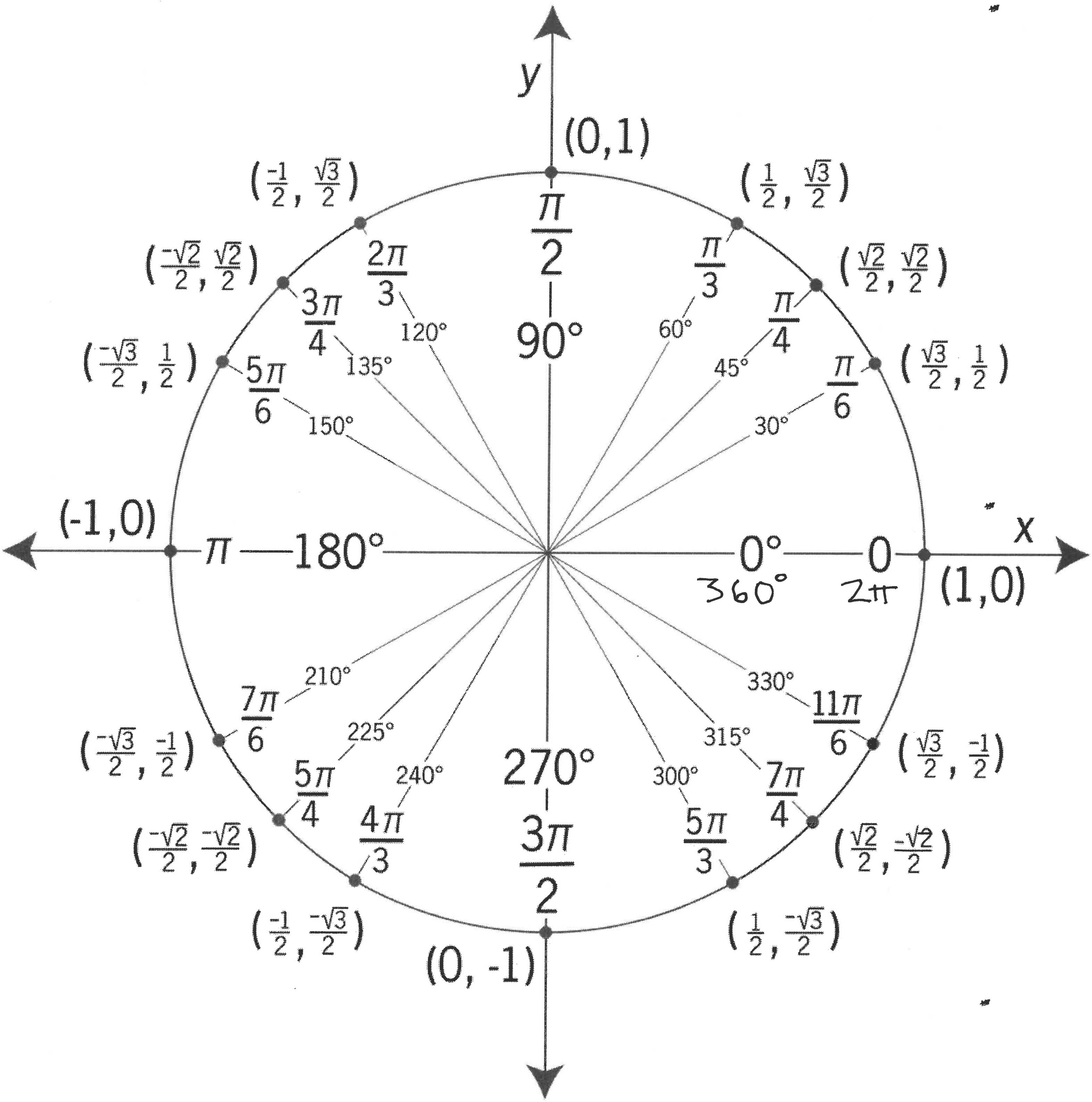
$(x + 10)^2 + (y - 11)^2 = 25$

$(x - h)^2 + (y - k)^2 = r^2$

CENTER (h, k) RADIUS $= r = 5$

CENTER $(-10, 11)$

THE UNIT CIRCLE



PART 1

Write the slope-intercept form of the equation of the line through the given points.

1) through: $(4, 4)$ and $(-5, -5)$
2) through: $(-1, -2)$ and $(-4, 0)$
3) through: $(0, -2)$ and $(5, 5)$
4) through: $(-3, 1)$ and $(5, -2)$
5) through: $(5, 0)$ and $(0, 2)$
6) through: $(-4, -1)$ and $(-2, 1)$

Write the point-slope form of the equation of the line through the given points.

7) through: $(4, 3)$ and $(1, -4)$
8) through: $(1, 4)$ and $(-4, 2)$
9) through: $(-2, 5)$ and $(4, -5)$
10) through: $(-4, -2)$ and $(0, -1)$
11) through: $(3, 3)$ and $(1, -4)$
12) through: $(2, -4)$ and $(0, 2)$

Write the standard form of the equation of the line through the given points.

13) through: $(-2, -1)$ and $(0, 2)$
14) through: $(4, -3)$ and $(0, 2)$
15) through: $(3, 0)$ and $(0, 4)$
16) through: $(0, 1)$ and $(-5, -3)$
17) through: $(-1, 4)$ and $(0, 3)$
18) through: $(0, 3)$ and $(-1, 0)$

Write the point-slope form of the equation of the line described.

19) through: $(3, 5)$, perp. to $y = -3x + 4$

20) through: $(5, 2)$, perp. to $y = -\frac{5}{4}x$

21) through: $(1, 2)$, perp. to $y = -\frac{1}{5}x + 4$

22) through: $(0, -5)$, perp. to $y = 4$

23) through: $(3, 3)$, perp. to $y = -\frac{7}{3}x - 3$

Find the point of intersection for each linear system. Use either substitution or elimination. If you want to be the GOAT, do each question with substitution AND with elimination.

24) $0 = 14y - 112 - 24x$
$-7y = 7 - 3x$

25) $12 - 6y = -21x$
$0 = -3x - 16 - 2y$

26) $4y - 28 = x$
$4y = 9x - 36$

27) $-x - y = 6$
$8x + 70 = 14y$

28) $15x - 18y + 108 = 0$
$12 = 6y - x$

29) $2y = -6 - x$
$-7 + y - 2x = 0$

30) $-2y = -5x + 6$
$8 = 3x + y$

31) $0 = 4x + 10y - 40$
$-\frac{1}{8}y = 1 - \frac{1}{4}x$

32) $-15y + 120 + 3x = 0$
$18x - 45 = 5y$

33) $-1 = -\frac{1}{2}y + \frac{1}{6}x$
$-90 - 8x = 18y$

Complete the square to write the vertex form equation of each parabola.

34) $y = 2x^2 + 40x + 203$
35) $y = -x^2 - 18x - 85$
36) $y = 7x^2 + 84x + 260$
37) $y = -7x^2 - 56x - 105$
38) $y = 2x^2 + 4x - 7$
39) $y = \frac{1}{20}x^2 - \frac{4}{5}x - \frac{29}{5}$
40) $y = 3x^2 - 12x + 17$
41) $y = x^2 - 8x + 25$
42) $y = -11x^2 - 66x - 102$
43) $y = -x^2 - 18x - 75$

Identify the min/max value and y-intercept of each. Then sketch the graph. PART 1

44) $y = 3x^2 + 30x + 69$
45) $y = x^2 + 12x + 37$
46) $y = x^2 + 10x + 28$
47) $y = -x^2 + 12x - 38$
48) $y = 2x^2 - 16x + 28$
49) $y = x^2 + 8x + 13$
50) $y = x^2 - 2x - 3$
51) $y = 2x^2 + 16x + 27$
52) $y = x^2 + 8x + 11$
53) $y = -\frac{1}{4}x^2 + \frac{5}{2}x - \frac{25}{4}$

Factor each completely. "GCF"

54) $3p^2 + 2p$
55) $7p^2 - 2p$
56) $9x^2 + 15x$
57) $35b^2 + 40b$
58) $25n^2 + 10n$

Factor each completely. "Traditional Quadratics"

59) $n^2 - 6n + 5$
60) $n^2 + 3n - 28$
61) $x^2 - 8x + 15$
62) $n^2 - 5n - 36$
63) $p^2 + 16p + 63$
64) $6b^2 + 96b + 378$
65) $2x^2 + 2x - 4$
66) $4x^2 - 20x - 200$
67) $5x^2 - 20x - 25$
68) $2p^2 - 20p + 50$
69) $30b^2 - 102b - 240$
70) $25n^2 + 70n - 120$
71) $15n^2 + 174n + 240$
72) $15r^2 - 99r - 168$
73) $42x^2 - 24x$
74) $27x^2 - 3x - 24$
75) $18x^2 - 3x - 6$
76) $27a^2 - 147a + 60$
77) $24b^2 + 144b$
78) $60x^2 - 114x + 54$

Factor each completely. "Special Case Quadratics: Difference of Squares and Perfect Square Trinomials"

79) $9v^2 + 24v + 16$
80) $125m^2 + 100m + 20$
81) $9x^2 + 12x + 4$
82) $20p^2 - 20p + 5$
83) $12k^2 + 12k + 3$
84) $n^2 - 9$
85) $20p^2 - 45$
86) $4b^2 - 1$
87) $9v^2 - 25$
88) $12m^2 - 75$

Factor each completely. "Quadratic Form"

89) $5x^4 + 5x^2 - 100$
90) $5x^4 + 30x^2 - 135$
91) $x^4 + 15x^2 + 54$
92) $a^4 - 8a^2 + 12$
93) $x^4 + 11x^2 + 18$
94) $20x^4 + 64x^2 + 12$
95) $6x^4 + 58x^2 + 36$
96) $28x^4 - 8x^2 - 36$
97) $7m^4 + 66m^2 + 27$
98) $6a^4 + 8a^2 + 2$

PART 1

Find the point(s) of intersection for each non-linear system. We only encounter this system type with one linear equation and one quadratic equation, so substitution is the required technique.

99) $-4x^2 + y^2 + x + 6y - 2 = 0$
$x - 3y + 4 = 0$

100) $5x^2 - 2y^2 - x - 11y - 33 = 0$
$x + y + 1 = 0$

101) $x^2 + 3y^2 - 23x + 3y + 108 = 0$
$x - 3y = 3$

102) $-2x^2 + 2y^2 + 3x + 19y + 27 = 0$
$x - 3y = -3$

103) $x^2 + y^2 + 9x - 3y - 2 = 0$
$x + y - 4 = 0$

104) $2x^2 - 4y^2 + 66x + y - 121 = 0$
$-2x + y + 1 = 0$

105) $x^2 + y^2 - x + 2y = 0$
$x + 2y = 1$

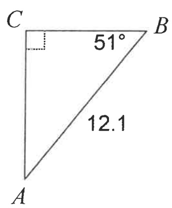
106) $x^2 + y^2 + 35x - 3y + 6 = 0$
$-3x + y + 1 = 0$

107) $-3x^2 - 37x + y - 106 = 0$
$x - y - 2 = 0$

108) $x^2 + y^2 + 3x + y = 0$
$3x + y = 0$

Find the measure of all missing sides and angles. Use right triangle trigonometry (SOH-CAH-TOA) Round answers to the nearest tenth.

109)



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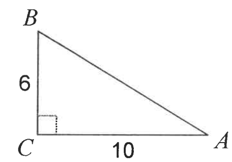

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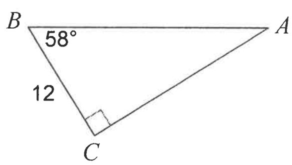

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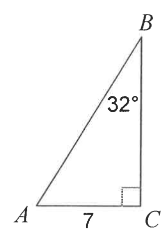
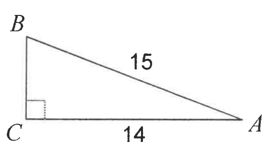
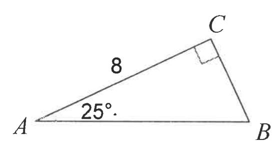


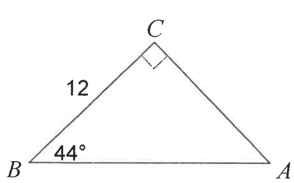
113)



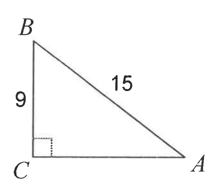
114)



115)



116)



Answers to PART 1

1) $y = x$

2) $y = -\frac{2}{3}x - \frac{8}{3}$

3) $y = \frac{7}{5}x - 2$

4) $y = -\frac{3}{8}x - \frac{1}{8}$

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

6) $y = x + 3$

7) $y - 3 = \frac{7}{3}(x - 4)$

8) $y - 4 = \frac{2}{5}(x - 1)$

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

10) $y + 2 = \frac{1}{4}(x + 4)$

11) $y - 3 = \frac{7}{2}(x - 3)$

12) $y + 4 = -3(x - 2)$

13) $3x - 2y = -4$

14) $5x + 4y = 8$

15) $4x + 3y = 12$

16) $4x - 5y = -5$

17) $x + y = 3$

18) $3x - y = -3$

19) $y - 5 = \frac{1}{3}(x - 3)$

20) $y - 2 = \frac{4}{5}(x - 5)$

21) $y - 2 = 5(x - 1)$

22) $0 = x$

23) $y - 3 = \frac{3}{7}(x - 3)$

24) $(-7, -4)$

25) $(-2, -5)$

26) $(8, 9)$

27) $(-7, 1)$

28) $(-6, 1)$

29) $(-4, -1)$

30) $(2, 2)$

31) $(5, 2)$

32) $(5, 9)$

33) $(-9, -1)$

34) $y = 2(x + 10)^2 + 3$

35) $y = -(x + 9)^2 - 4$

36) $y = 7(x + 6)^2 + 8$

37) $y = -7(x + 4)^2 + 7$

38) $y = 2(x + 1)^2 - 9$

39) $y = \frac{1}{20}(x - 8)^2 - 9$

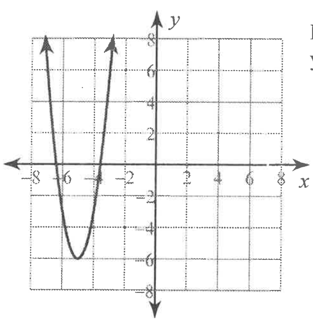
40) $y = 3(x - 2)^2 + 5$

41) $y = (x - 4)^2 + 9$

42) $y = -11(x + 3)^2 - 3$

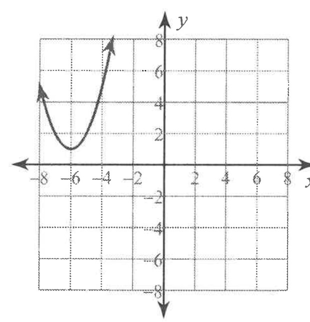
43) $y = -(x + 9)^2 + 6$

44)



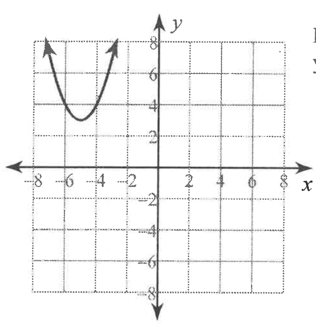
Min value = –6
y-int: 69

45)



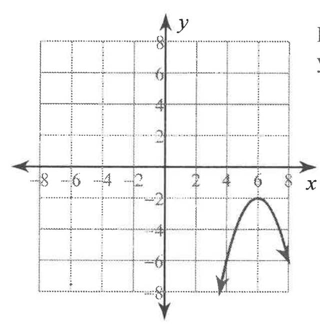
Min value = 1
y-int: 37

46)



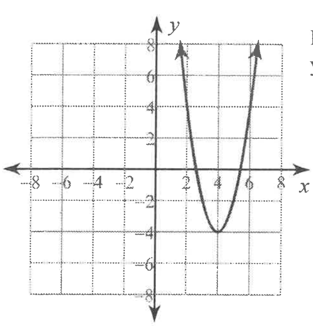
Min value = 3
y-int: 28

47)



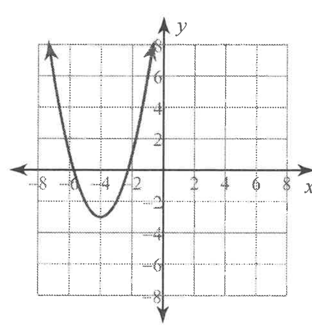
Max value = –2
y-int: –38

48)



Min value = –4
y-int: 28

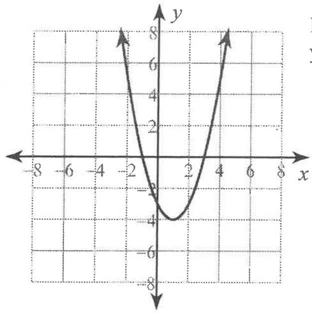
49)



Min value = –3
y-int: 13

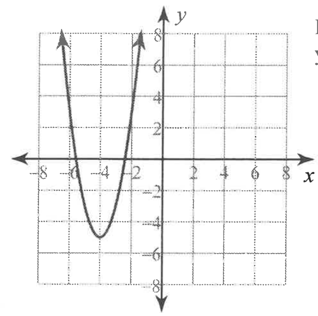
ANSWERS TO PART 1 CONTINUED

50)



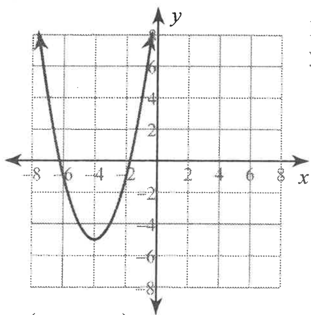
Min value = –4
y-int: –3

51)



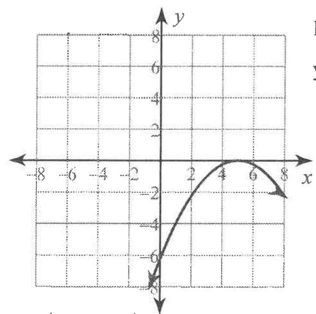
Min value = –5
y-int: 27

52)



Min value = –5
y-int: 11

53)



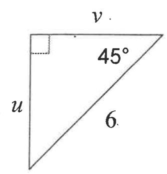
Max value = 0
y-int: $-\frac{25}{4}$

54) $p(3p+2)$
55) $p(7p-2)$
56) $3x(3x+5)$
57) $5b(7b+8)$
58) $5n(5n+2)$
59) $(n-1)(n-5)$
60) $(n-4)(n+7)$
61) $(x-5)(x-3)$
62) $(n+4)(n-9)$
63) $(p+7)(p+9)$
64) $6(b+7)(b+9)$
65) $2(x+2)(x-1)$
66) $4(x+5)(x-10)$
67) $5(x+1)(x-5)$
68) $2(p-5)^2$
69) $6(5b+8)(b-5)$
70) $5(5n-6)(n+4)$
71) $3(5n+8)(n+10)$
72) $3(5r+7)(r-8)$
73) $6x(7x-4)$
74) $3(x-1)(9x+8)$
75) $3(2x+1)(3x-2)$
76) $3(a-5)(9a-4)$
77) $24b(b+6)$
78) $6(x-1)(10x-9)$
79) $(3v+4)^2$
80) $5(5m+2)^2$
81) $(3x+2)^2$
82) $5(2p-1)^2$
83) $3(2k+1)^2$
84) $(n+3)(n-3)$
85) $5(2p+3)(2p-3)$
86) $(2b+1)(2b-1)$
87) $(3v+5)(3v-5)$
88) $3(2m+5)(2m-5)$
89) $5(x-2)(x+2)(x^2+5)$
90) $5(x^2-3)(x^2+9)$
91) $(x^2+9)(x^2+6)$
92) $(a^2-2)(a^2-6)$
93) $(x^2+2)(x^2+9)$
94) $4(5x^2+1)(x^2+3)$
95) $2(3x^2+2)(x^2+9)$
96) $4(7x^2-9)(x^2+1)$
97) $(7m^2+3)(m^2+9)$
98) $2(3a^2+1)(a^2+1)$
99) $(2, 2), (-1, 1)$
100) $(2, -3), (-4, 3)$
101) $(9, 2)$
102) $(-3, 0), (9, 4)$
103) $(-1, 5)$
104) $(3, 5)$
105) $(1, 0)$
106) $(-1, -4)$
107) $(-6, -8)$
108) $(0, 0)$
109) $m\angle A = 39°,\ a = 7.6,\ b = 9.4$
110) $m\angle A = 31°,\ m\angle B = 59°,\ c = 11.7$
111) $m\angle A = 32°,\ b = 19.2,\ c = 22.6$
112) $m\angle A = 58°,\ a = 11.2,\ c = 13.2$
113) $m\angle B = 69°,\ m\angle A = 21°,\ a = 5.4$
114) $m\angle B = 65°,\ a = 3.7,\ c = 8.8$
115) $m\angle A = 46°,\ b = 11.6,\ c = 16.7$
116) $m\angle A = 36.9°,\ m\angle B = 53.1°,\ b = 12$

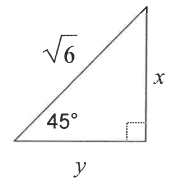
PART 2

Use special right triangle side relationships to find the missing side lengths. Leave your answers as radicals in simplest form.

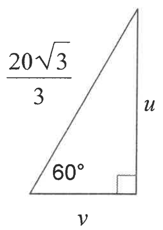
1)



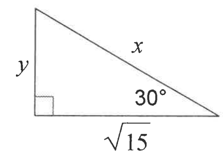
2)



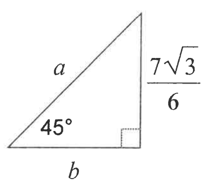
3)



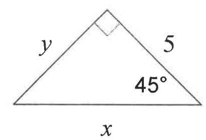
4)



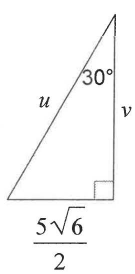
5)



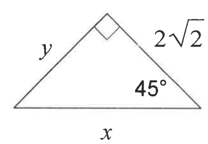
6)



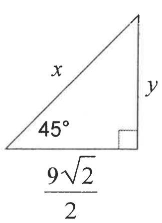
7)



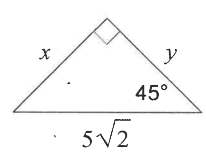
8)



9)



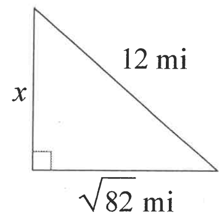
10)



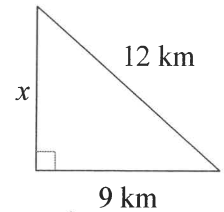
Use the Pythagorean Theorem to find the missing side of each triangle. Leave your answers in simplest radical form.

PART 2

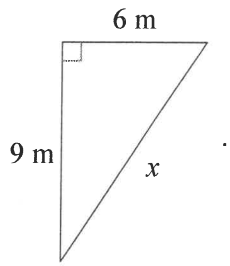
11)



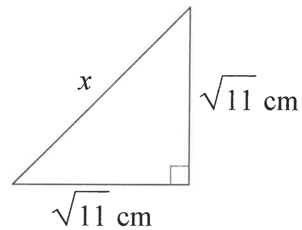
12)



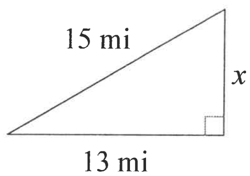
13)



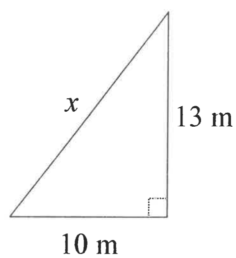
14)



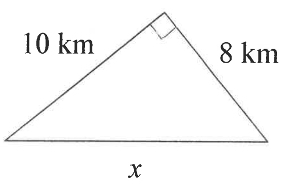
15)



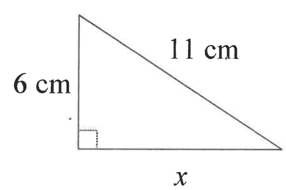
16)



17)



18)



Find the distance between each pair of points.

19) $(-7, -8), (8, 2)$

20) $(0, 4), (-4, -3)$

21) $(-4, 1), (-3, 0)$

22) $(-5, 6), (-1, 8)$

23) $(4, -8), (6, 2)$

24) $(4, 0), (-6, 4)$

Find the midpoint of the line segment with the given endpoints.

25) $(0, 0), (-9, 5)$

26) $(-2, 9), (-6, 3)$

27) $(-3, -1), (-4, -5)$

28) $(0, -4), (-6, -3)$

29) $(1, 6), (0, 7)$

30) $(-6, -3), (-2, -10)$

Complete the square to identify the center and radius of each circle

31) $0 = -y^2 - 105 + 6y + 22x - x^2$

32) $16x = -y^2 - 19 - 12y - x^2$

33) $y^2 = 18y + 26x - x^2 - 249$

34) $2x - 2y - 223 = -y^2 - x^2$

35) $y^2 - 10x + 8y = -x^2 + 59$

36) $-6x + y^2 + 10y - 162 = -x^2$

37) $x^2 - 16y = -y^2 - 21 + 14x$

38) $x^2 - 20y + 92 + y^2 = -2x$

39) $x^2 - 22y = -169 - 16x - y^2$

40) $y^2 = 12x - 10y + 3 - x^2$

Answers to PART 2

1) $u = 3\sqrt{2},\ v = 3\sqrt{2}$

2) $x = \sqrt{3},\ y = \sqrt{3}$

3) $u = 10,\ v = \frac{10\sqrt{3}}{3}$

4) $x = 2\sqrt{5},\ y = \sqrt{5}$

5) $a = \frac{7\sqrt{6}}{6},\ b = \frac{7\sqrt{3}}{6}$

6) $x = 5\sqrt{2},\ y = 5$

7) $u = 5\sqrt{6},\ v = \frac{15\sqrt{2}}{2}$

8) $x = 4,\ y = 2\sqrt{2}$

9) $x = 9,\ y = \frac{9\sqrt{2}}{2}$

10) $x = 5,\ y = 5$

11) $\sqrt{62}$ mi

12) $3\sqrt{7}$ km

13) $3\sqrt{13}$ m

14) $\sqrt{22}$ cm

15) $2\sqrt{14}$ mi

16) $\sqrt{269}$ m

17) $2\sqrt{41}$ km

18) $\sqrt{85}$ cm

19) $5\sqrt{13}$

20) $\sqrt{65}$

21) $\sqrt{2}$

22) $2\sqrt{5}$

23) $2\sqrt{26}$

24) $2\sqrt{29}$

25) $\left(-4\frac{1}{2}, 2\frac{1}{2}\right)$

26) $(-4, 6)$

27) $\left(-3\frac{1}{2}, -3\right)$

28) $\left(-3, -3\frac{1}{2}\right)$

29) $\left(\frac{1}{2}, 6\frac{1}{2}\right)$

30) $\left(-4, -6\frac{1}{2}\right)$

31) Center: $(11, 3)$
Radius: 5

32) Center: $(-8, -6)$
Radius: 9

33) Center: $(13, 9)$
Radius: 1

34) Center: $(-1, 1)$
Radius: 15

35) Center: $(5, -4)$
Radius: 10

36) Center: $(3, -5)$
Radius: 14

37) Center: $(7, 8)$
Radius: $2\sqrt{23}$

38) Center: $(-1, 10)$
Radius: 3

39) Center: $(-8, 11)$
Radius: 4

40) Center: $(6, -5)$
Radius: 8