GEOMETRY HONORS SUMMER REVIEW

Welcome to Honors Geometry at Morton High School!

Dear Parents and Students,

Mathematics is a discipline that constantly builds on previous knowledge. Students entering Honors Geometry are expected to recall and apply the material that they learned in Algebra I from day one. We begin the year with brand new Geometry content and do not reteach concepts or begin with a "review chapter." When you return to school in the fall, **there will be a test** over major Algebra 1 concepts on the second full day of class to help determine your placement and readiness for Honors Geometry. **Your performance on this test will be a significant factor in determining if you maintain your placement in honors.** To help you prepare for this test and for Honors Geometry in general, the high school mathematics department has compiled a list of problems that represent some of the most frequently used Algebra I concepts. Students are expected to complete the entire packet over the summer and to begin the semester ready to ask questions about problems they did not understand. We recommend doing 1/3 of the problems from each section/topic each month. This will help keep the material fresh and identify areas that need improvement.

Class time will be provided on Thursday, August 16th for questions, as the Geometry Honors Prerequisite Content Test is scheduled for Friday, August 17th. Teachers will help clarify directions when necessary, but will not answer questions such as "Am I doing this right?" or "Can you give me a hint?" The purpose of this test is to determine what *you* know, not what we know. Honors mathematics classes at Morton High School do not permit extra time on quizzes or tests, and this test is no exception. Students who are thoroughly prepared should have no problem completing the test within 45 minutes.

If you should happen to lose this packet, you can find it posted on the Morton High School website at **http://mhs.morton709.org/my-class/math**
You will find a listing of all of our classes. Please select Geometry Honors Summer Review.

If you have any questions, contact Mrs. Durand at rosie.durand@mcusd709.org.

Have a wonderful summer!
The Mathematics Department
Morton High School

Note: For those students who will be purchasing a graphing calculator:
Please read the attached letter regarding graphing calculator requirements for MHS mathematics courses. You may send your student to school with the calculator's packaging intact to for the math teacher to verify the correct calculator was purchased. CAS versions of the TI-Nspire are NOT allowed for students enrolled in Geometry.

GEOMETRY HONORS SUMMER REVIEW

FOR STUDENTS NEEDING TO PURCHASE A CALCULATOR:

MORTON HIGH SCHOOL Required Calculator: TI-Nspire CX

At Morton High School, all students use graphing calculators extensively in their math classes, whether they are in Algebra I through AP Calculus. This requirement has existed for a couple of years now; students are making great strides in mathematical understanding and performance as we continue to implement the use of the TI-Nspire CX. It is of critical importance that students obtain a calculator from the approved list because MHS math teachers have demonstration software for these specific devices, and it reduces the amount of class time spent on teaching students how to use the calculator.

In past years, Texas Instruments has offered schools a special opportunity to collect proof of purchase cards from students to be used towards a free TI-Nspire Navigator system or other TI-Nspire products. This system would allow us to wirelessly network graphing calculators to the teacher's computer, giving us the ability to let students demonstrate what they are doing to the class, receive document files from their teacher on their Nspire, and even use their calculator as a way to answer questions the teacher has posed to the class.

If you will be purchasing a new TI-Nspire CX (the latest version of the Nspire, which has a color screen) between now and the start of the 2018-19 school year, would you please return the entire "compare models" card that comes with the calculator to your child's math teacher? It will help us to obtain the Navigator system at no cost to the district. There is a picture of this card included on the next page. You must return the entire card, not just the "TI Points." **Do NOT purchase a calculator with CAS as part of its name.**

If your child will be using a hand me down TI-Nspire from an older sibling, such as the greyscale model, we will no longer be able to install the latest operating system nor will we be able to use this calculator with the Navigator system. It does, however, have most all of the functionality of the CX and can still be used with much success.

DO **NOT** PURCHASE THE TI-NSPIRE **CAS** OR TI-NSPIRE CX-**CAS**. Although the CAS is allowed on the SAT, these calculators are not allowed on the ACT and thus not allowed for students enrolled in MHS courses other than AP Calculus.

Thanks for helping us make sure your child receives the best possible math education with the latest tools available.

If the purchase of a graphing calculator will place an undue financial burden on your family, please contact your counselor or your math teacher.

Be sure to save the <u>entire card</u> with the TI Technology points and turn it in to any math teacher! With enough collected, the department will be able to earn software for use with your students!

GEOMETRY HONORS SUMMER REVIEW

The technology students need. The value you want.

Get TI-Nspire™ CX handhelds for math and science learning without impacting the school budget.

Many schools and districts have adopted a student-purchase program to help bring handheld technology into their math and science classrooms.
They have made this shift to help ease the pressure of decreasing budgets while offering competitive, technology-rich classrooms. Providing the best tools for student success is a top priority for every educator.

Research† findings
When students own a handheld for use in class and at home, they are able to develop a deeper understanding of concepts. **Research also shows improvements in scores on national, state and school-level tests.**

†Learn more at education.ti.com/research.

Longevity of use
A handheld purchase offers years of use – from middle grades through college – in a wide range of subjects, including:

Middle Grades Math	Geometry	Statistics	Biology
Pre-Algebra	Precalculus	Calculus	Chemistry
Algebra 1 & 2	Trigonometry		Physics

Long-term support
Curricular content, professional development and training, free technical support, software updates and parent communications are a few of the many educator support resources that are a staple of TI educational technology.

Handheld/software bundle
Each TI-Nspire CX and TI-Nspire™ CX CAS handheld purchased at a retail or retail online store comes together with TI-Nspire™ Student Software (PC or Mac®) for home use. Students can learn with the handheld in class and the software on a desktop or laptop computer at home or college. Handheld and software functionality are virtually identical.

Exam acceptance
The TI-Nspire™ CX handheld and the TI-Nspire™ CX CAS handheld** are permitted on a growing number of state math and science tests and college entrance exams that include:

- » SAT*
- » ACT®
- » PSAT/NMSQT*
- » AP*
- » IB®
- » Praxis™

The TI-Nspire CX CAS handheld is not permitted on the ACT or IB exams.

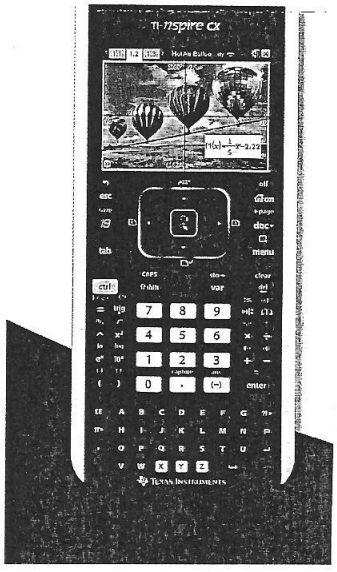
Free test prep and more with student purchase
Students who purchase a TI-Nspire CX or TI-Nspire CX CAS handheld can download free SAT* and ACT® practice questions from The Princeton Review™ for review on their handheld.

Enhanced graphing and computer features for the TI-Nspire CX handheld

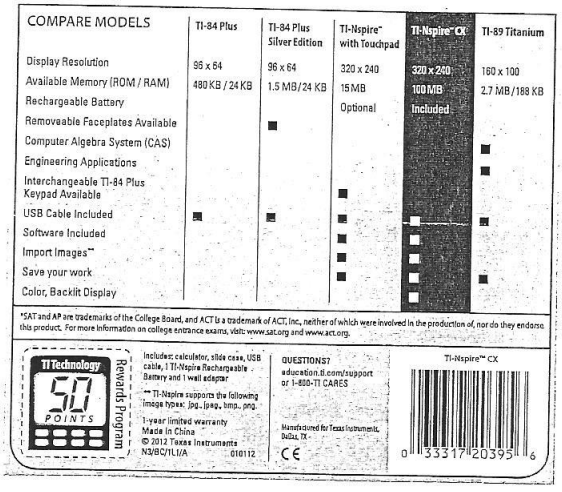
- » Bright, backlit, full-color screen
- » Touchpad enables easy navigation through screens and menus
- » Thin, lightweight design
- » Ability to upload and view photos and images
- » Multiple representations on a single screen
- » Ability to save files

PERMITTED ON TESTING SAT ACT AP IB

TI-Nspire™ CX handheld



» **Claimants must send in the bottom half of the back of the retail package card for each of the 60 packages Tech Rewards Points (TRP) labels, as in this example:**



GEOMETRY HONORS SUMMER REVIEW

I. ORDER OF OPERATIONS

Example: Simplify

$$\frac{2^2-3\cdot 4+7}{5-2^2\cdot 3+6}=\frac{4-3\cdot 4+7}{5-4\cdot 3+6}$$

$$=\frac{4-12+7}{5-12+6}$$

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

$=1$

Simplify.

1. $2^3-3^2=$
2. $2\cdot 3-4\cdot 2+7=$
3. $5(-1)+6(-2)=$
4. $(-2)(3)-(-1)(7)-(-2)=$
5. $3\cdot 2^2-16\cdot 3^2=$
6. $6+(3-4)-2=$
7. $6+3-(4-2)=$
8. $3^2-8\cdot 2+7^2-35=$
9. $-4(2^3)-6=$
10. $(8-2)^2=$
11. $(4-6)^2=$
12. $4-6^2=$
13. $\left[32\div(-4)\right]\div 2=$
14. $32\div\left[(-4)\div 2\right]=$
15. $\dfrac{4-3^2}{8^2+2}=$
16. $\dfrac{7^2-8^2+1^3}{2^3+3^2-2^3}=$
17. $\dfrac{2(8+3)-4(7+2)}{5(6-1)-3(8-6)}=$
18. $\dfrac{32\left(2-4\right)+4}{4\cdot 9-3\left(6+1\right)}=$
19. $\dfrac{8-4^2+3\cdot 5}{4\cdot 2-3^2+9}=$
20. $\dfrac{2\cdot 3-4\cdot 5+6}{-20\div\left(-5\right)\div 8}=$

II. FACTORING POLYNOMIALS

Examples: Factor Completely.

a. $4x^3+12x^2-8x=4x(x^2+3x-2)$

b. $5x^3-3x^2+20x-12=x^2(5x-3)+4(5x-3)=(5x-3)(x^2+4)$

c. $x^2+2x-35=(x+7)(x-5)$

d. $3x^2-5x-2=(3x+1)(x-2)$

e. $x^2-18x+81=(x-9)^2$

f. $4x^2-25y^2=(2x+5y)(2x-5y)$

Factor Completely.

1. $x^2-6x-16=$
2. $4y^2+7y-2=$
3. $5a^3-25a^2+15a=$
4. $9x^2-16=$
5. $x^2-64=$
6. $a^2+12a+27=$
7. $6x^2+12x+6=$
8. $x^3+2x^2-5x-10=$
9. $x^3+2x^2-5x-10=$
10. $x^2-10x+21=$
11. $6y^2-54=$
12. $4y^2-17y-15=$
13. $6x^2-7x+2=$
14. $5x^2-5=$
15. $y^5+3y^3+4y^2+12=$
16. $x^2-7x-18=$
17. $x^2-8x+16=$
18. $a^2-9a+14=$
19. $49x^2-1=$
20. $8x^4-4x^3+12x^2=$
21. $y^2+10y+25=$
22. $3a^2+12a-3=$
23. $x^4-81=$
24. $9y^2-12y+4=$
25. $a^2+11a+30=$
26. $8t^2+2t-3=$
27. $75x^2-30x+3=$
28. $3t^2-8t-3=$
29. $x^2+3x+8x+24=$
30. $y^2-22y+121=$

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III. RADICALS

Examples:

Simplify $\sqrt{48}$

$\sqrt{48} = \sqrt{16 \bullet 3}$

$= \sqrt{16} \bullet \sqrt{3}$

$= 4\sqrt{3}$

Simplify $\sqrt{18} + \sqrt{32} + \sqrt{75}$

$\sqrt{18} + \sqrt{32} + \sqrt{75} = \sqrt{9} \bullet \sqrt{2} + \sqrt{16} \bullet \sqrt{2} + \sqrt{25} \bullet \sqrt{3}$

$= 3\sqrt{2} + 4\sqrt{2} + 5\sqrt{3}$

$= 5\sqrt{3} + 7\sqrt{2}$

Simplify $\sqrt{\frac{5}{3}}$

$\sqrt{\frac{5}{3}} = \frac{\sqrt{5}}{\sqrt{3}}$

$= \frac{\sqrt{5}}{\sqrt{3}} \bullet \frac{\sqrt{3}}{\sqrt{3}}$

$= \frac{\sqrt{15}}{3}$ or $\frac{1}{3}\sqrt{15}$

Simplify.

1. $\sqrt{4}$
2. $\sqrt{27}$
3. $\sqrt{72}$
4. $\sqrt{32}$
5. $\sqrt{98}$
6. $\sqrt{200}$
7. $\sqrt{20}$
8. $\sqrt{24}$
9. $5\sqrt{18}$
10. $\sqrt{4+9}$
11. $\sqrt{3^2+4^2}$
12. $\sqrt{5^2+12^2}$
13. $\frac{1}{6}\sqrt{48}$
14. $\sqrt{49 \bullet 3}$
15. $\frac{1}{\sqrt{2}}$
16. $\frac{1}{\sqrt{5}}$
17. $\frac{4}{\sqrt{2}}$
18. $\frac{6}{\sqrt{3}}$
19. $4\sqrt{3} + 7\sqrt{3}$
20. $7\sqrt{2} + \sqrt{3} + 6\sqrt{3} + \sqrt{2}$
21. $\sqrt{12} + \sqrt{27}$
22. $\sqrt{72} + \sqrt{75} - \sqrt{48}$

IV. SLOPE AND EQUATIONS OF LINES

Examples:

a) Find a slope-intercept equation for the line with slope 2 that contains (0,5)

$y = mx + b$ The slope-intercept equation

$y = 2x + 5$ Substitute 2 for *m* and 5 for *b*

b) Find an equation of a line that contains the points (5, -2) and (-2, 1)

$m = \frac{1-(-2)}{-2-5} = \frac{3}{-7} = -\frac{3}{7}$ First find the slope.

$y = -\frac{3}{7}x + b$ Use the slope-intercept form and substitute for m.

$1 = -\frac{3}{7}(-2) + b$ Use the point (-2, 1)* and substitute for x and y.

$1 = \frac{6}{7} + b$ *(We could have just as easily used (5, -2))

$\frac{1}{7} = b$

$y = -\frac{3}{7}x + \frac{1}{7}$ Substitute for *b*.

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Find an equation of the line containing the given point and having the given slope.

1. $(4,-3)$, $m=-1$
2. $(-5,-6)$, $m=2$
3. $(-7,2)$, $m=3$
4. $(3,5)$, $m=-2$
5. $(6,-2)$, $m=-3$
6. $(5,-2)$, $m=2$
7. $(7,0)$, $m=-3$
8. $(0,9)$, $m=2$
9. $(5,-1)$, $m=\frac{1}{5}$
10. $(-3,-2)$, $m=\frac{1}{4}$

Find an equation of the line that contains the given pair of points.

11. $(1,5)$ and $(4,2)$
12. $(-4,2)$ and $(1,-3)$
13. $(-5,-3)$ and $(1,-1)$
14. $(0,3)$ and $(-2,6)$
15. $(-8,3)$ and $(-4,1)$
16. $(6,2)$ and $(-3,0)$
17. $(1,3)$ and $(4,6)$
18. $(3,-4)$ and $(-3,4)$
19. $(-7,4)$ and $(-4,7)$
20. $(9,-5)$ and $(7,7)$

V. SYSTEMS OF EQUATIONS

Examples:

a) Solve using the substitution method: $5x-2y=4$, $y=5-x$

Substitute $5-x$ for y.

$5x-2y=4$
$5x-2(5-x)=4$
$5x-10+2x=4$
$7x=14$
$x=2$

Then substitute 2 for x and solve for y.

$y=5-x$
$y=5-2$
$y=3$
The solution is $(2,3)$

b) Solve using the elimination method. $2x+7y=-1$, $-x-2y=2$

Multiply the second equation by 2 and then add.

$2x+7y=-1$
$-2x-4y=4$
$3y=3$
$y=1$

Then substitute 1 for y and solve for x

$2x+7y=-1$
$2x+7(1)=-1$
$2x+7=-1$
$2x=-8$
$x=-4$
The solution is $(-4,1)$

Solve.

1. $4x+3y=1$, $x=1-y$
2. $2x-y=6$, $-x+y=-1$
3. $6x-y=3$, $4x-2y=-2$
4. $2x+3y=7$, $x=1-4y$

GEOMETRY HONORS SUMMER REVIEW

5. $\begin{cases} 2x+3y=6 \\ x-3y=-15 \end{cases}$

6. $\begin{cases} 7x-5y=4 \\ y=3x-4 \end{cases}$

7. $\begin{cases} 2y-5x=-1 \\ x=2y+5 \end{cases}$

8. $\begin{cases} 4x+3y=1 \\ 3x+5y=-13 \end{cases}$

9. $\begin{cases} 6x-5y=3 \\ 4x+3y=21 \end{cases}$

10. $\begin{cases} x+y=4 \\ 3x+4y=10 \end{cases}$

11. $\begin{cases} -3x+y=2 \\ 7x-8y=1 \end{cases}$

12. $\begin{cases} 7x+2y=2 \\ x-2y=14 \end{cases}$

13. $\begin{cases} 9y-2x=-7 \\ x-3y=5 \end{cases}$

14. $\begin{cases} 3x-5y=8 \\ 4x-7y=12 \end{cases}$

15. $\begin{cases} 5x+2y=12 \\ 3x-4y=2 \end{cases}$

16. $\begin{cases} x+4y=7 \\ 3x+7y=6 \end{cases}$

17. $\begin{cases} 5x-8y=25 \\ -x+4y=-7 \end{cases}$

18. $\begin{cases} 8x-6y=0 \\ x+9y=\frac{13}{4} \end{cases}$

19. $\begin{cases} \frac{2}{3}x+\frac{1}{4}y=18 \\ \frac{1}{6}x-\frac{3}{8}y=-6 \end{cases}$

VI. QUADRATIC EQUATIONS

Examples: Solve for x

$x^2-10x=-16$
$x^2-10x+16=0$
$(x-8)(x-2)=0$
$x-8=0$ or $x-2=0$
$x=8$ or $x=2$

$x^2+5x=0$
$x(x+5)=0$
$x=0$ or $x+5=0$
$x=0$ or $x=-5$

Solve for x

1. $x^2-5x-6=0$
2. $x^2+4x-12=0$
3. $x^2-8x+15=0$
4. $x^2-18-3x=0$
5. $x^2-36=9x$
6. $-x^2+5x+36=0$
7. $x^2-4x=0$
8. $x^2=10x$
9. $x^2-2x=11x$
10. $5x=x^2-3x$
11. $3x^2+5x-7=x^2+8x+28$
12. $12x^2-15=-11x$
13. $8x^2-7x+9=2x^2+6x+7$

VII. QUADRATIC FORMULA

Example: Solve $3x^2-5x+1=0$ using the Quadratic Formula

$3x^2-5x+1=0$

$a=3 \quad b=-5 \quad c=1$

Quadratic Formula
$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

$$x=\frac{-(-5)\pm\sqrt{(-5)^2-4(3)(1)}}{2(3)}$$
$$=\frac{5\pm\sqrt{25-12}}{6}=\frac{5\pm\sqrt{13}}{6}$$

Solve.

1. $x^2-3x=4$
2. $y^2-6y=-8$
3. $x^2=10x-25$

4. $2y^2 - 7y - 15 = 0$
5. $x^2 - 36 = 0$
6. $y^2 - 49 = 0$
7. $x^2 - 3x - 3 = 0$
8. $x^2 - 5x - 7 = 0$
9. $y^2 - 8y + 11 = 0$
10. $y^2 + 7y - 1 = 0$
11. $x^2 + 6x + 8 = 4$
12. $x^2 - 3x + 1 = 6$
13. $4x^2 + 7x + 2 = 0$
14. $5x^2 - 3x - 1 = 0$
15. $2x^2 - 3x = 3$
16. $6x^2 + 6x = 8$
17. $4y^2 - 6y - 1 = 0$
18. $2y^2 - 5y = -3$
19. $8x^2 = 200$
20. $9x^2 = 144$

ANSWER KEY

I. Order of Operations

1. -1
2. 5
3. -17
4. 3
5. -132
6. 3
7. 7
8. 7
9. -38
10. 36
11. 4
12. -32
13. -4
14. -16
15. $\frac{-5}{66}$
16. $-\frac{14}{9}$
17. $-\frac{14}{19}$
18. -4
19. $\frac{7}{8}$
20. -16

II. Factoring Polynomials

1. $(x-8)(x+2)$
2. $(4y-1)(y+2)$
3. $5a(a^2 - 5a + 3)$
4. $(3x+4)(3x-4)$
5. $(x+8)(x-8)$
6. $(a+9)(a+3)$
7. $6(x+1)^2$
8. $(x^2 - 5)(x+2)$
9. $(x^2 - 5)(x+2)$
10. $(x-7)(x-3)$
11. $6(y+3)(y-3)$
12. $(4y+3)(y-5)$
13. $(2x-1)(3x-2)$
14. $5(x-1)(x+1)$
15. $(y^2+3)(y^3+4)$
16. $(x-9)(x+2)$
17. $(x-4)^2$
18. $(a-7)(a-2)$
19. $(7x+1)(7x-1)$
20. $4x^2(2x^2 - x + 3)$
21. $(y+5)^2$
22. $3(a^2 + 4a - 1)$
23. $(x^2+9)(x+3)(x-3)$
24. $(3y-2)^2$
25. $(a+5)(a+6)$
26. $(4t+3)(2t-1)$
27. $3(5x-1)^2$
28. $(3t+1)(t-3)$
29. $(x+8)(x+3)$
30. $(y-11)^2$

III. Radicals

1. 2
2. $3\sqrt{3}$
3. $6\sqrt{2}$
4. $4\sqrt{2}$
5. $7\sqrt{2}$
6. $10\sqrt{2}$
7. $2\sqrt{5}$
8. $2\sqrt{6}$
9. $15\sqrt{2}$
10. $\sqrt{13}$
11. 5
12. 13
13. $\frac{2\sqrt{3}}{3}$
14. $7\sqrt{3}$
15. $\frac{\sqrt{2}}{2}$
16. $\frac{\sqrt{5}}{5}$
17. $2\sqrt{2}$
18. $2\sqrt{3}$
19. $11\sqrt{3}$
20. $8\sqrt{2} + 7\sqrt{3}$
21. $5\sqrt{3}$
22. $6\sqrt{2} + \sqrt{3}$

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IV. Slope and Equations of Lines

1. $y=-x+1$
2. $y=2x+4$
3. $y=3x+23$
4. $y=-2x+11$
5. $y=-3x+16$
6. $y=2x-12$
7. $y=-3x+21$
8. $y=2x+9$
9. $y=\frac{1}{5}x-2$
10. $y=\frac{1}{4}x-\frac{5}{4}$
11. $y=-x+6$
12. $y=-x-2$
13. $y=\frac{1}{3}x-\frac{4}{3}$
14. $y=-\frac{3}{2}x+3$
15. $y=-\frac{1}{2}x-1$
16. $y=\frac{2}{9}x+\frac{2}{3}$
17. $y=x+2$
18. $y=-\frac{4}{3}x$
19. $y=x+11$
20. $y=-6x+49$

V. Systems of Equations

1. $(-2,3)$
2. $(5,4)$
3. $(1,3)$
4. $(5,-1)$
5. $(-3,4)$
6. $(2,2)$
7. $(-1,-3)$
8. $(4,-5)$
9. $(3,3)$
10. $(6,-2)$
11. $(-1,-1)$
12. $(2,-6)$
13. $(8,1)$
14. $(-4,-4)$
15. $(2,1)$
16. $(-5,3)$
17. $\left(\frac{11}{3},-\frac{5}{6}\right)$
18. $\left(\frac{1}{4},\frac{1}{3}\right)$
19. $(18,24)$

VI. Quadratic Equations

1. $\{6,-1\}$
2. $\{2,-6\}$
3. $\{5,3\}$
4. $\{6,-3\}$
5. $\{12,-3\}$
6. $\{9,-4\}$
7. $\{0,4\}$
8. $\{0,10\}$
9. $\{0,13\}$
10. $\{0,8\}$
11. $\left\{5,-\frac{7}{2}\right\}$
12. $\left\{-\frac{5}{3},\frac{3}{4}\right\}$
13. $\left\{\frac{1}{6},2\right\}$

VII. Quadratic Formula

1. $\{-1,4\}$
2. $\{2,4\}$
3. $\{5\}$
4. $\left\{-\frac{3}{2},5\right\}$
5. $\{-6,6\}$
6. $\{-7,7\}$
7. $\left\{\frac{3\pm\sqrt{21}}{2}\right\}$
8. $\left\{\frac{5\pm\sqrt{53}}{2}\right\}$
9. $\left\{4\pm\sqrt{5}\right\}$
10. $\left\{\frac{-7\pm\sqrt{53}}{2}\right\}$
11. $\left\{-3\pm\sqrt{5}\right\}$
12. $\left\{\frac{3\pm\sqrt{29}}{2}\right\}$
13. $\left\{\frac{-7\pm\sqrt{17}}{8}\right\}$
14. $\left\{\frac{3\pm\sqrt{29}}{10}\right\}$
15. $\left\{\frac{3\pm\sqrt{33}}{4}\right\}$
16. $\left\{\frac{-3\pm\sqrt{57}}{6}\right\}$
17. $\frac{3\pm\sqrt{13}}{4}$
18. $\left\{1,\frac{3}{2}\right\}$
19. $\{-5,5\}$
20. $\{-4,4\}$