ANSWER KEY

Math III - Skills Review Packet

INSTRUCTIONS

The purpose of this packet is to help you brush up on the BASIC skills you need to have mastered as we go into review week. You will **complete this packet over the break.**

The completed packet is **due Monday, January 5th** at the beginning of class. A 10 point reduction will be assessed for each day the packet is late. The completed packet will count as **½ a unit test grade (formal).**

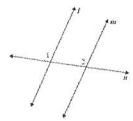
An electronic version of this document can be found on the Math 3 WIKI page and your teacher's webpage. To easily access video links, bring up the document on the website and click on the links in the document.

TRIANGLE PROOFS

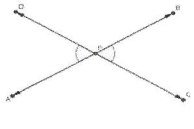
Match each term with its corresponding picture.

1. **Reflexive** D
2. **Vertical Angles** B
3. **Corresponding Angles** A
4. **SAS** C
5. **Bisector** E

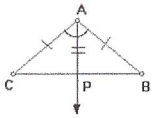
A



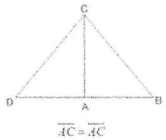
B



C

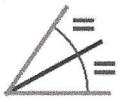


D



$\overline{AC} = \overline{AC}$

E



Math III - Skills Review Packet

FUNCTION TRANSFORMATIONS

Review Videos

VIDEO LINK https://www.youtube.com/watch?v=mDjWUzQ6_g0

Graph and Find the Vertex of: $f(x) = -2(x-1)^2 + 3$

V = (1, 3)

VIDEO LINK https://www.youtube.com/watch?v=TiJrnc-xKS8

What are the transformations from the parent function $f(x) = -\frac{3}{2}(x+2)^3 - 3$

flip
stretch factor 3/2
L 2
D 3

List all of the transformations of the following functions:

1) $f(x) = \sqrt{x-3} + 2$

R 3
U 2

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

flip
stretch factor 3
L 1
D 5

3) $f(x) = -\frac{1}{4}|x-6| - 5$

flipped
compression factor 4
R 6
D 5

4) $f(x) = \frac{1}{2}(x+1)^3 - 4$

compression factor 2
L 1
D 4

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SIMPLIFYING RADICALS

Review Videos

VIDEO LINK https://www.youtube.com/watch?v=-Vq2z4DKWoA#t=21

$\sqrt{54}$ $3\sqrt{6}$

$\sqrt[4]{48x^6y^2z^8}$ $2x^3z^2\sqrt{3y^2z^2}$

Practice

1. $\sqrt{40}$ $2\sqrt{10}$

2. $\sqrt{75}$ $5\sqrt{3}$

3. $\sqrt{60x^5}$ $2x^2\sqrt{15x}$

4. $\sqrt[3]{24}$ $2\sqrt{3}$

5. $\sqrt{40x^6y^5}$ $2x^3y^2\sqrt{10y}$

6. $\sqrt[3]{24x^3y^8}$ $2xy^3\sqrt[3]{y^2}$

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QUADRATIC FORMULA

VIDEO LINK https://www.youtube.com/watch?v=QZ4XCHTZYn8

Solve: $\frac{1}{3}t^2+\frac{1}{2}t=2$ multiply through by 6

$2t^2+3t=12$

$2t^2+3t-12=0$

$\frac{-3\pm\sqrt{9-4(2)(-12)}}{2(2)}$

VIDEO LINK https://www.youtube.com/watch?v=J3304SzvitM

Solve: $x^2+2x+10=0$

$\frac{-2\pm\sqrt{4-(4)(10)}}{2(1)}$ $\frac{-2\pm\sqrt{-36}}{2}$

$=\frac{-2\pm 6i}{2}=-1\pm 3i$

Solve the following:

1. $x^2-8x-15=0$ $\frac{8\pm\sqrt{64-4(-15)}}{2(1)}$

2. $2x^2+3=7x \Rightarrow 2x^2-7x+3=0$ $\frac{7\pm\sqrt{49-4(2)(3)}}{2(2)}$

3. $5x+1=-3x^2$ $3x^2+5x+1=0$ $\frac{-5\pm\sqrt{25-4(3)(1)}}{2(3)}$

4. $4x^2+4x=-1$ $4x^2+4x+1=0$ $\frac{-4\pm\sqrt{16-4(4)(1)}}{2(4)}$

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Polynomial Division – Long Division

Review Videos

VIDEO LINK https://www.youtube.com/watch?v=I6_ghhd7kwQ

$\frac{x^2+4x-8}{x-2} = (x\ )(x\ )$

$x-2 \overline{)\ x^2+4x-8}$

$x+6$

$-x^2+2x$

$6x-8$

$-6x+12$

4

$x+6$ R 4

VIDEO LINK https://www.youtube.com/watch?v=FTRDPB1wR5Y

$\frac{x^4-x^2+x-4}{x^2-2x+5}$

$x^2-2x+5 \overline{)\ x^4+0x^3-x^2+x-4}$

x^2+2x-2

$-x^4+2x^3-5x^2$

$2x^3-6x^2+x$

$-2x^3+4x^2-10x$

$-2x^2-9x-4$

$+2x^2+4x+10$

$13x+6$

x^2+2x-2 R $13x+6$

Independent Practice

$(x^2-74) \div (x-8)$

$x-8 \overline{)\ x^2+0x-74}$

$x+8$

$-x^2+8x$

$8x-74$

$-8x+64$

10

$x+8$ R 10

$\frac{2p^2+7p-39}{2p-7}$

$2p-7 \overline{)\ 2p^2+7p-39}$

$p+7$

$-2p^2+7p$

$14p-39$

$-14p+49$

10

$p+7$ R10

Math III - Skills Review Packet

Polynomial Division – Synthetic Division

Review Videos

VIDEO LINK https://www.youtube.com/watch?v=bZoMz1Cy1T4

$\frac{x^3-2x^2+3x-4}{x-2}$

$2 \mid 1\ -2\ 3\ -4$

$\downarrow\ \ 2\ 0\ 6$

$1\ \ 0\ 3\ \ 2$

x^2+3 R 2

VIDEO LINK https://www.youtube.com/watch?v=nefo9cUo-wg

$\frac{x^4-x^2+5}{x+3}$

$-3 \mid 1\ 0\ -1\ 0\ 5$

$\downarrow\ \ -3\ 9\ -24\ 72$

$1\ -3\ 8\ -24\ 78$

$x^3-3x^2+8x-24$ R 78

Independent Practice

$(n^3+7n^2+14n+3) \div (n+2)$

$-2 \mid 1\ 7\ 14\ 3$

$\downarrow\ \ -2\ -10\ -8$

$1\ 5\ 4\ 5$

n^2+5n+4 R 5

$\frac{p^3-10p^2+20p+26}{p-5}$

$5 \mid 1\ -10\ 20\ 26$

$\downarrow\ \ 5\ -25\ -25$

$1\ -5\ -5\ 1$

x^2-5x-5 R 1

$(x^4+4x+1) \div (x-1)$

$1 \mid 1\ 0\ 0\ 4\ 1$

$\downarrow\ \ 1\ 1\ 1\ 5$

$1\ 1\ 1\ 5\ 6$

x^3+x^2+x+5 R 6

$\frac{q^3-12q^2+36}{p+2}$

$-2 \mid 1\ -12\ 0\ 36$

$\downarrow\ \ -2\ 28\ -56$

$1\ -14\ 28\ -20$

$x^2-14x+28$ R -20

Math III - Skills Review Packet

Logarithms

Properties

VIDEO LINK http://patrickjmt.com/properties-of-logarithms-part-1/

$\log_{10} 100 = x$ → $10^x = 100$, $x = 2$

$\log_2 x = 3$ → $2^3 = x$, $x = 8$

$\log_7 \left(\frac{1}{49}\right) = x$ → $7^x = \frac{1}{49}$, $x = -2$

$\log_3 \left(\frac{x^2(y+1)}{z^3}\right)$ → $2\log_3 x + \log_3(y+1) - 3\log z$

Expanding and Condensing

VIDEO LINK https://www.youtube.com/watch?v=nefo9cUo-wg

$\log_7 5x^3yz^2$ → $\log_7 5 + 3\log_7 x + \log_7 y + 2\log_7 z$

$5\log x - 4\log y$ → $\log \frac{x^5}{y^4}$

Independent Practice

Convert to the alternate form

$\log_2 16 = 4$ → $2^4 = 16$

$\log_7 x = 3$ → $7^3 = x$

$\log_5(x-1) = 2$ → $5^2 = x-1$

$\log_{27} x = \frac{1}{3}$ → $27^{1/3} = x$

$\ln x = 0$ → $e^0 = x$

$\ln 3 = x$ → $e^x = 3$

$2^3 = 8$ → $\log_2 8 = 3$

$(x+2)^2 = y$ → $\log_{(x+2)} y = 2$

$e^2 = x$ → $\ln x = 2$

$e^{x+1} = y$ → $\ln y = x+1$

$x^{0.5} = y$ → $\log_x y = 1/2$

$27^x = y$ → $\log_{27} y = x$

Expand the following log statements

$\log_5 25x^2yz^{\frac{1}{3}}$ → $2 + 2\log_5 x + \log_5 y + \frac{1}{3}\log_5 z$ (↻ $\log_5 25 = 2$)

$\log\left(\frac{(x+2)^2y^3}{p^5q}\right)$

$\ln ex^2y$ → $\ln e + 2\ln x + \ln y$, $1 + 2\ln x + \ln y$

Condense the following statements into a single logarithm

$2\log x + 3\log y - \frac{1}{2}\log z$ → $\log \frac{x^2y^3}{\sqrt{z}}$

$\ln p - 2\ln q - \ln r$ → $\ln \frac{p}{q^2r}$

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RATIONAL FUNCTIONS

Simplifying Rational Functions:

VIDEO LINK http://patrickjmt.com/rational-expressions-multiplying-and-dividing-ex-1/

http://patrickjmt.com/rational-expressions-writing-in-lowest-terms-ex-2/

$\frac{x+2}{x^2+5x+6}$ → $\frac{x+2}{(x+2)(x+3)}$, $\frac{1}{x+3}$, $x \neq -2, -3$

$\frac{x^2+2x-15}{x^2+x-12}$ → $\frac{(x-3)(x+5)}{(x-3)(x+4)}$, $\frac{x+5}{x+4}$, $x \neq -5, -4$

$\frac{x^3+1}{x^2+7x+6}$ → $\frac{(x+1)(x^2-x+1)}{(x+1)(x+6)} = \frac{x^2-x+1}{x+6}$, $x \neq -1, 6$

$\frac{2x^2+11x+5}{3x^2+17x+10}$ → $\frac{(2x+1)(x+5)}{(3x+2)(x+5)}$, $\frac{2x+1}{3x+2}$, $x \neq -\frac{1}{2}, -\frac{2}{3}$

$\frac{7x-28}{x^2-16}$ → $\frac{7(x-4)}{(x+4)(x-4)} =$ $\frac{7}{x+4}$, $x \neq +4, -4$

FACTOR NUMERATOR

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

$(2x+1)(x+5)$

FACTOR DENOM.

$(x+\frac{2}{3})(x+\frac{15}{5})$

$(3x+2)(x+5)$

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Adding & Subtracting Rational Expressions:

VIDEO LINK http://patrickjmt.com/rational-expressions-adding-and-subtracting-ex-1/

http://patrickjmt.com/rational-expressions-adding-and-subtracting-ex-2/

$\frac{7}{x^2-64}+\frac{3}{x+8}$

$\frac{7}{(x+8)(x-8)}+\frac{3(x-8)}{(x+8)(x-8)}$

$\frac{7+3(x-8)}{(x+8)(x-8)}$

$\frac{3x-17}{x^2-64}$

$\frac{2}{x^2+5x+4}-\frac{3}{x^2-1}$

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

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

$\frac{2x-2-3x-12}{(x+1)(x+4)(x-1)}=\frac{-x-14}{(x+1)(x+4)(x-1)}$

$\frac{4}{x^2-25}+\frac{6}{x^2+6x+5}$

$\frac{4}{(x-5)(x+5)}+\frac{6}{(x+1)(x+5)}$

$\frac{4(x+1)}{(x-5)(x+5)(x+1)}+\frac{6(x-5)}{(x-5)(x+5)(x+1)}$

$\frac{4x+4+6x-30}{(x-5)(x+5)(x+1)}$

$\frac{10x-26}{(x+5)(x-5)(x+1)}$

$\frac{x+2}{x^2+4x+4}-\frac{2}{x+2}$

$\frac{x+2}{(x+2)(x+2)}-\frac{2(x+2)}{(x+2)(x+2)}$

$\frac{x+2-2x-4}{(x+2)(x+2)}$

$\frac{-x-2}{(x+2)(x+2)}$

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Multiplying & Dividing Rational Expressions:

http://patrickjmt.com/rational-expressions-multiplying-and-dividing-ex-3/

VIDEO LINK http://patrickjmt.com/rational-expressions-multiplying-and-dividing-ex-2/

http://patrickjmt.com/rational-expressions-multiplying-and-dividing-ex-1/

$\frac{8-k}{k^2-64}\div\frac{k-8}{k+8}$ $-k+8=(k-8)$

$\frac{-(k-8)}{(k+8)(k-8)}\cdot\frac{k+8}{(k-8)}$

$\frac{-1}{k-8}$

$\frac{5y^2+y}{y^2-1}\div\frac{10y^2+2y}{4y^2+y-5}$

$\frac{y(5y+1)}{(y+1)(y-1)}\div\frac{2y(5y+1)}{(y+5)(4y-1)}=\frac{y(5y+1)}{(y+1)(y-1)}\cdot\frac{(y+5)(4y-1)}{2y(5y+1)}$

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

$\frac{3x^2+7x+2}{x^2-2x-8}*\frac{x^2-3x-4}{x^2+3x+2}$

$\frac{(2x+1)(x+3)}{(x+2)(x-4)}\cdot\frac{(x+1)(x-4)}{(x+1)(x+2)}$

$\frac{(2x+1)(x+3)}{(x+2)(x+2)}$

$\frac{x^2+2x+1}{x^2-1}*\frac{x^2+3x+2}{x^2+4x+4}$

$\frac{(x+1)(x+1)}{(x+1)(x-1)}\cdot\frac{(x+1)(x+2)}{(x+2)(x+2)}$

$\frac{(x+1)(x+1)}{(x-1)(x+2)}$

$\frac{x^2-3x-10}{2x^2-11x+5}\div\frac{x^2-5x+6}{2x^2-7x+3}$

$\frac{(x+2)(x-5)}{(2x-1)(x-5)}\div\frac{(x-2)(x-3)}{(2x-1)(x-3)}$

$\frac{(x+2)(x-5)}{(2x-1)(x-5)}\cdot\frac{(2x-1)(x-3)}{(x-2)(x-3)}$

$\frac{x+2}{x-2}$

$(x+\frac{1}{2})(x+\frac{6}{2})$

$(2x+1)(x+3)$

$(x-\frac{1}{2})(x-\frac{6}{2})$

$(2x-1)(x-3)$

$(x-1)(x-10)$

$(2x-1)(x-5)$

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Solving Rational Function Equations:

VIDEO LINK http://patrickjmt.com/rational-equations-solving/

$\frac{6}{x^2}-\frac{5}{x}=1$ $x=-6,+1$

$\frac{6}{x^2}-\frac{5x}{x^2}=\frac{x^2}{x^2}$

$6-5x=x^2$

$0=x^2+5x-6$

$(x+6)(x-1)$

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

$\frac{2(x-4)}{(x+2)(x-4)}+\frac{2(x+2)}{(x+2)(x-4)}=\frac{(x+2)(x-4)}{(x+2)(x-4)}$

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

$4x-4=x^2-2x-8$

$0=x^2-6x-4$ solve using quad formula

$\frac{3}{2x-4}=\frac{5}{3x+7}$

$3(3x+7)=5(2x-4)$

$9x+21=10x-20$

$41=x$

$\frac{2}{x+2}+\frac{5}{x-2}=\frac{6}{x^2-4}$

$2(x-2)+5(x+2)=6$

$2x-4+5x+10=6$

$7x+6=6$

$7x=0$

$x=0$

Math III - Skills Review Packet

EQUATIONS OF CIRCLES

Review Videos

VIDEO LINK https://www.youtube.com/watch?v=JvDpYlyKkNU

The equation of a circle C is $(x+3)^2+(y-4)^2=49$. What are its center (h,k) and its radius, r?

C (-3,4) R 7

Practice

1. The equation of a circle C is $(x-2)^2+(y+5)^2=25$. What are its center (h,k) and its radius, r?

   C (2,-5) R 5

2. The equation of a circle C is $(x)^2+(y+1)^2=81$. What are its center (h,k) and its radius, r?

   C (0,-1) R 9

3. Write the equation of a circle with center (2,3) and radius 4.

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

4. Write the equation of a circle with center (-5,2) and radius $\sqrt{3}$

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