MPM2DO/E

EXAM REVIEW

Unit 1: Linear Systems

1. Does the ordered pair satisfy the equation?
   a. $2x-y=-7.5;\ (2.5,-2.5)$
   b. $y=\frac{1}{3}x+305;\ (78,331)$
2. Determine if the given point is a solution to the system of equations.
   a. $y=3x-1,\ y=2x;\ (-2,-4)$
   b. $2y+x=8,\ y=2x+4;\ (0,4)$
3. Solve each system graphically.
   a. $\begin{aligned} y&=x-3 \\ 7-x&=y \end{aligned}$ b. $\begin{aligned} y&=3x-1 \\ x-2y+8&=0 \end{aligned}$ c. $\begin{aligned} 5y+3x&=0 \\ y&=x-4 \end{aligned}$
4. Without solving, determine the number of solutions to each system.
   a. $\begin{aligned} 3x+2y&=11 \\ y&=4-\frac{3}{2}x \end{aligned}$ b. $\begin{aligned} 3x+2y&=11 \\ 6x-4y&=19 \end{aligned}$ c. $\begin{aligned} 6x-4y+14&=0 \\ 9x-6y&=-21 \end{aligned}$
5. Solve each system by substitution.
   a. $\begin{aligned} x+3y&=2 \\ 4x-5y&=25 \end{aligned}$ b. $\begin{aligned} 3x+4y&=7 \\ 7x-y&=-25 \end{aligned}$ c. $\begin{aligned} 4x+y&=3 \\ 3x-2y&=1 \end{aligned}$ d. $\begin{aligned} 3y+3x&=-5 \\ x+y&=5 \end{aligned}$
6. Solve each system by elimination.
   a. $\begin{aligned} 5x+3y&=41 \\ 4x-3y&=-5 \end{aligned}$ b. $\begin{aligned} 2x+3y&=1 \\ 5x+4y&=20 \end{aligned}$ c. $\begin{aligned} 3x+7y&=41 \\ 4x-5y&=26 \end{aligned}$ d. $\begin{aligned} \frac{x}{2}+\frac{y}{7}&=7 \\ \frac{3x}{5}-\frac{y}{2}&=-1 \end{aligned}$
7. Myron invested $7000, part of it at 6%per annum and the remainder at 8% per annum. After one year, the total interest from both investments was $540. How much did he invest at each rate?
8. White vinegar is available as a 5% acetic acid solution and a 10% acetic acid solution, by volume. How many milliliters of each solution must be mixed to make 100mL of a 7% solution?
9. A boat took 2.5h to travel 40km down a river with the current and 4h to make the return trip against the current. Find the speed of the boat in still water and the speed of the current.
10. Sheighla drove 570km in 6.5h. She drove part of the way in good weather at 100km/h and the rest of the way in foggy weather at 60km/h. How far did she drive at each speed?

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EXAM REVIEW

Unit 1: Linear Systems Answers

1a. no b. yes

2a. no b. yes

3a. $(5,2)$ b. $(2,5)$ c. $\left(\frac{5}{2},-\frac{3}{2}\right)$

4a. no solution b. one solution c. infinite solutions

5a. $(5,-1)$ b. $(-3,4)$ c. $\left(\frac{7}{11},\frac{5}{11}\right)$ d. no solution

6a. $(4,7)$ b. $(8,-5)$ c. $(9,2)$ d. $(10,14)$

7. $1000 at 6% and $6000 at 8%

8. 60mL of 5% solution and 40mL of 10% solution

9. speed of boat is 13km/h; speed of current is 3km/h

10. 450km at 100km/h and 120km at 60km/h

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EXAM REVIEW

Unit 2: Analytic Geometry

1. Find the length of the line segment joining each pair of points. Express each length as an exact solution.
   a. $(3,7)$ *and* $(1,4)$ b. $(-1,6)$ *and* $(2,-3)$ c. $(3,-4)$ *and* $(-4,3)$

2. ΔMNP has vertices $M(-4,3), N(-2,-1)$ and $P(6,1)$.
   a. Classify the triangle according to the lengths of sides.
   b. Determine the perimeter of the triangle.

3. Determine the radius of each circle.
   a. $x^2+y^2=121$ b. $x^2+y^2=23^2$

4. Given the endpoints of each line segment, find the coordinates of the midpoint without plotting the points.
   a. $(0,5)$ *and* $(-6,5)$ b. $(-2,6)$ *and* $(-2,-1)$ c. $(1,-6)$ *and* $(13,-6)$

5. Verify that the diagonals of a parallelogram with vertices $P(2,-1), Q(6,6), R(1,-2)$ and $S(-3,-9)$ bisect each other.

6. One endpoint and the midpoint of the line segment are given. Find the coordinates of the other endpoint.
   a. Endpoint $(1,1)$, midpoint $(-2,4)$ b. Endpoint $(-2,-1)$, midpoint $(2,2)$

7. For ΔDEF with vertices $D(-2,17)$, $E(6,-5)$ and $F(14,7)$, M is the midpoint of DE and N is the midpoint of DF.
   a. Verify that MN is parallel to EF.
   b. Verify that MN is half the length of EF.

8. ΔJKL has vertices $J(2,0), K(-4,6)$ and $L(2,10)$. Determine an equation (in standard form) for
   a. The median from L to JK.
   b. The right bisector of JK.
   c. The altitude from L to JK.

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EXAM REVIEW

Unit 2: Analytic Geometry Answers

1a. $\sqrt{13}$ b. $3\sqrt{10}$ c. $7\sqrt{2}$

2a. scalene b. $2\sqrt{5}+2\sqrt{26}+2\sqrt{17}$

3a. 11 b. 23

4a. $(-3,5)$ b. $(-2,2.5)$ c. $(7,-6)$

5. The midpoint of QS and PR is $\left(\frac{3}{2},-\frac{3}{2}\right)$

6a. $(-5,7)$ b. $(6,5)$

7a. $M(2,6), N(6,12)$, $m_{MN}=\frac{3}{2}$, $m_{EF}=\frac{3}{2}$

8a. $7x-3y+16=0$ b. $x-y+4=0$ c. $x-y+8=0$

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EXAM REVIEW

Unit 3: Polynomials

1. Simplify.
   a. $(2a+3b)+(5a-b)$ b. $(7m-3n+p)+(4m+6n-5p)$
   c. $(x-3y+8z)-(2x+y-4z)+(3x+5y-7z)$ d. $(5a^2b+3b^3-c^2)-(2a^2b+3c^2+3b^3)$
2. Expand and simplify.
   a. $2a(-a-7)+3a(5a^2+a+4)$ b. $x(3x-5)-8(3x^2-2x+1)$
3. Find the product.
   a. $(a-5)(a+1)$ b. $(7x-y)(x+2y)$
4. Expand and simplify.
   a. $2(x-5)(3x-2)$ b. $24+3(a-1)(a+4)-2(2a+1)(5a-3)$
5. Expand.
   a. $(d+4)^2$ b. $(7a-4b)^2$ c. $(5p+2)(5p-2)$ d. $(6x+7y)(6x-7y)$
6. Factor.
   a. $3abc+4a^2bc-9abc^3$ b. $12w-8w^3+36w^2$ c. $18x^3y^2z^4-6x^2y^2z^2+45x^4y^3z^3$
7. Factor.
   a. a^2-7a+6 b. $b^2-2b-63$
8. Factor completely.
   a. $5x^2+50x+45$ b. $3q^2-6q-24$
9. Factor.
   a. $c^2-7cd+12d^2$ b. $7xy^2-84xy-315x$
10. Factor.
    a. $2y^2-5y-25$ b. $2x^2+7x+3$
11. Factor.
    a. $2x^2-11x+15$ b. $6x^2+5x-6$
12. Factor.
    a. $18a^2+24a+6$ b. $30t^2-58t-28$
13. Factor.
    a. $4t^2-7ts-2s^2$ b. $5y^2-12yz-9z^2$
14. Factor, if possible.
    a. m^2-121 b. x^2+16 c. $64y^2-169z^2$ d. $16x^2y-80y$
15. Factor.
    a. $9a^2-24a+16$ b. $4b^2+44b+121$

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EXAM REVIEW

Unit 3: Polynomial Answers

1a. $7a+2b$ b. $11m+3n-4p$ c. $2x+y+5z$ d. $3a^2b-4c^2$

2a. $15a^3+a^2-2a$ b. $-21x^2+11x-8$

3a. a^2-4a-5 b. $7x^2+13xy-2y^2$

4a. $6x^2-34x+20$ b. $-17a^2+11a+18$

5a. $d^2+8d+16$ b. $49a^2-56ab-16b^2$ c. $25p^2-4$ d. $36x^2-49y^2$

6a. $abc\left(3+4a-9c^2\right)$ b. $4w\left(3-2w^2+9w\right)$ c. $3x^2y^2z^2\left(6xz^2-2+15x^2yz\right)$

7a. $(a-6)(a-1)$ b. $(b-9)(b+7)$

8a. $5(x+9)(x+1)$ b. $3(q-4)(q+2)$

9a. $(c-3d)(c-4d)$ b. $7x(y-15)(y+3)$

10a. $(2y+5)(y-5)$ b. $(2x+1)(x+3)$

11a. $(x-3)(2x-5)$ b. $(3x-2)(2x+3)$

12a. $6(3a+1)(a+1)$ b. $2(5t+2)(3t-7)$

13a. $(4t+s)(t-2s)$ b. $(5y+3z)(y-3z)$

14a. $(m+11)(m-11)$ b. not possible c. $(8y-13z)(8y+13z)$ d. $16y\left(x^2-5\right)$

15a. $(3a-4)^2$ b. $(2b+11)^2$

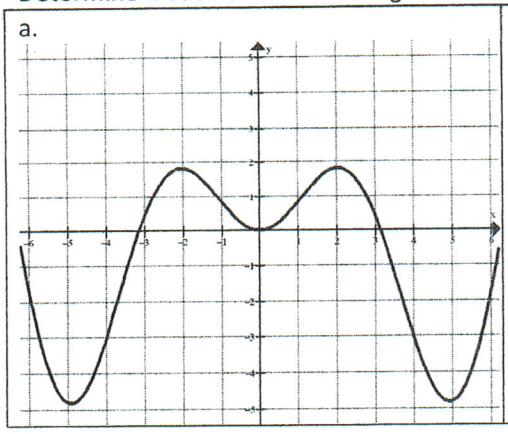
MPM2DO/E

EXAM REVIEW

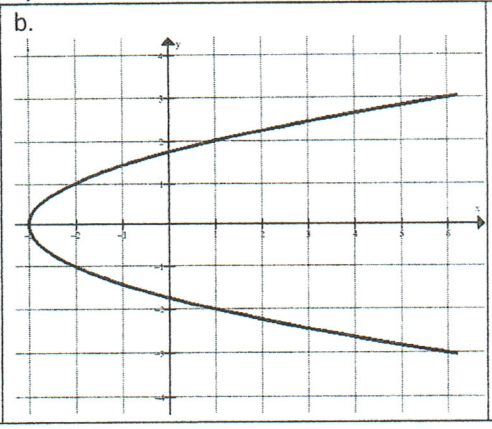
Unit 4: Quadratic Functions

1. Determine if each of the following relation represents a function. Give a reason for your answer.

a.



b.



c. $\{(3,2),(4,-1),(4,5),(6,8)\}$

d. $\{(1,1),(2,5),(3,5),(4,1)\}$

2. Determine the domain and range for the relations in questions 1bcd.

3. Given the following parabolas,
   a. Determine the coordinates of the vertex and state the first differences.
   b. Use the vertex and the first differences to produce a graph of each function.

   i. $y=2x^2-5$ ii. $y=-(x+1)^2+3$ iii. $y=2(x-2)^2-4$

4. Determine the vertex for each of the following quadratics.

   a. $y=x^2-12x+2$ b. $y=-3x^2-42x-11$ c. $y=-x^2+3x+1$

5. A football is punted so that its path is described by the function $h=-4.9(t-2.2)^2+25$, in metres and seconds.
   a. What is the maximum height reached by the football?
   b. When does the maximum height occur?

6. Mr. Armstrong wishes to build a fence around his rectangular garden. He has 44m of fencing. Determine, algebraically, the dimensions of the largest rectangular area he can create for his garden.

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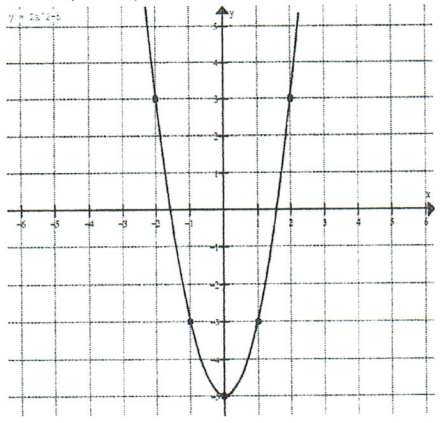
EXAM REVIEW

Unit 4: Quadratic Functions Answers

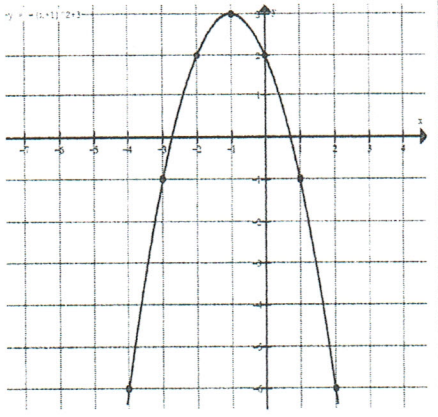
1a. Yes. Passes the vertical line test. b. No. Fails the VLT c. No. When x=4, y= -1 AND 5 d. Yes. All different x values

2b. $D=\{x\geq -3\}, R=\{all\ real\ numbers\}$ c. $D=\{3,4,6\}, R=\{-1,2,5,8\}$ d. $D=\{1,2,3,4\}, R=\{1,5\}$

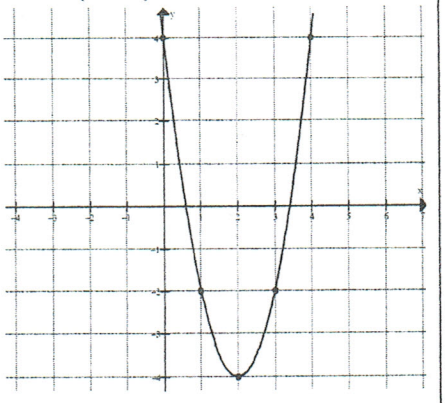
3i. $V(0,-5)$, $FDs: 2,6,10,\ldots$



3ii. $V(-1,3)$, $FDs: -1,-3,-5,\ldots$



3iii. $V(2,-4)$, $FDs: 2,6,10,\ldots$



4a. $V(6,-34)$ b. $V(-7,136)$ c. $V\left(\frac{3}{2},\frac{13}{4}\right)$

5a. 25m b. When t=2.2s

6. 11mX11m

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EXAM REVIEW

Unit 5: Quadratic Equations

1. Solve by factoring.

   a. $x^2-9x+18=0$ b. $12+13x+x^2=0$ c. $3x^2-4=-8x-1$ d. $2x^2-6x-8=0$

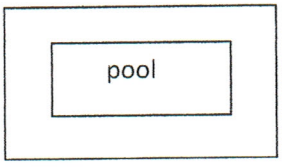
   e. $6x^2-11x=0$ f. $5x^2=-2x$ g. $2x^2=50$ h. $\frac{x^2}{2}-\frac{3x}{2}=-1$

2. Solve using the quadratic formula. Express your answers in exact form.

   a. $5x^2-8x-4=0$ b. $0=2x^2+x-6$ c. $8x^2+18x=-9$ d. $x^2-2x+6=0$

   e. $3x^2-4x-2=0$ f. $x^2+14x+9=0$

3. Mr. Armstrong wishes to build a deck of uniform width around his pool. The pool is rectangular and has dimensions 6m by 9m. If the area of the deck is the same as the area of the pool, determine the width of the deck.



4. Graph the following functions showing the x-intercepts and the vertex.

   a. $y=x^2-10x+24$ b. $y=x^2-4$

5. A football is punted into the air. Its height is modeled by the equation $h=-4.9t^2+21.6t+1.3$, in metres and seconds. Determine the amount of time the football is in the air before it hits the ground. Round to the nearest tenth of a second.

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EXAM REVIEW

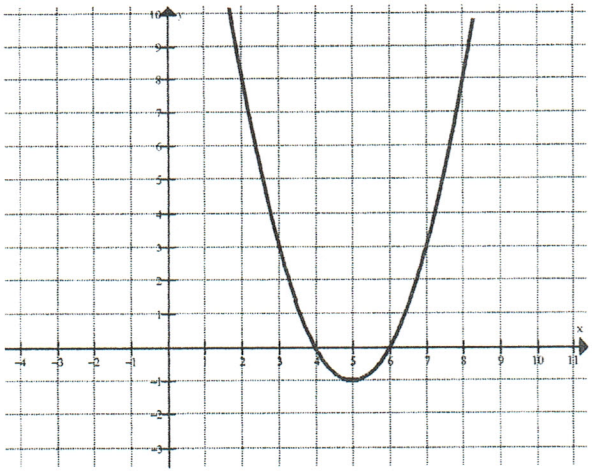
Unit 5: Quadratic Equations Answers

1a. 6,3 b. -12, -1 c. $-3, \frac{1}{3}$ d. 4,-1 e. $0, \frac{11}{6}$ f. $0, -\frac{2}{5}$ g. -5,5 h. 1,2

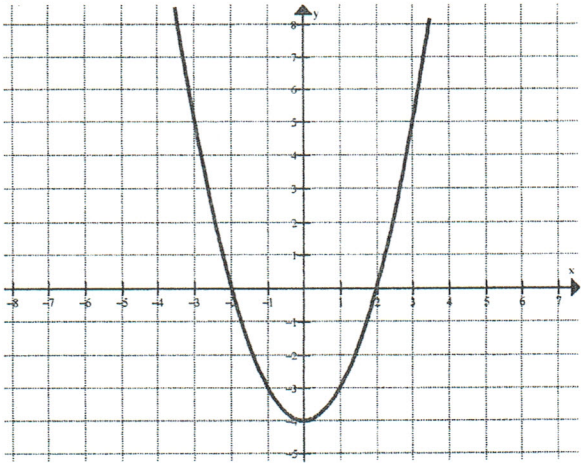
2a. $2, -\frac{2}{5}$ b. $\frac{3}{2}, -2$ c. $-\frac{3}{2}, -\frac{3}{4}$ d. $\frac{2 \pm \sqrt{-20}}{2}$; *no real roots* e. $\frac{2 \pm \sqrt{10}}{3}$ f. $-7 \pm 2\sqrt{10}$

3. 1.5m

4a.



b.



5. 4.5s.

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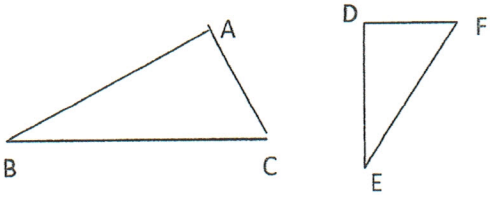
EXAM REVIEW

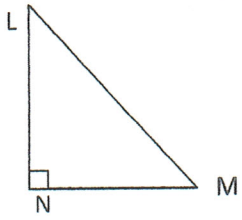
Unit 6: Similar Triangles and Trigonometry

1. $\Delta ABC \sim \Delta DEF$. Find the values of a and f given $c=8cm, b=6cm, e=3cm, d=5cm$.



2. Find the tangent, sine and cosine ratio for each angle, to the nearest thousandth.
   a. $32°$ b. $59°$ c. $6°$

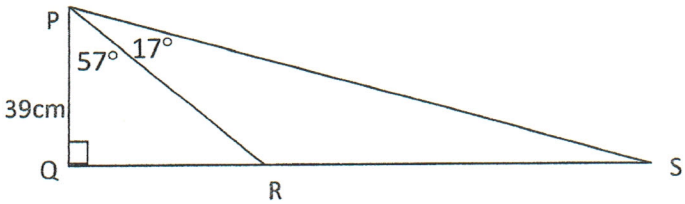
3. Solve the following triangle given $\angle M=40°$ and $l=3m$.



4. Arnie is sitting at the edge of a lake, flying a kite. The length of the kite string is 85m. He estimates the angle of elevation to be $30°$. What is the height of the kite above the water? Round to the nearest tenth.

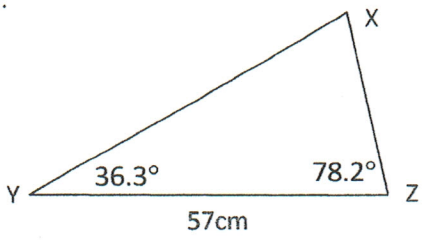
5. In ΔABC, $\angle C=90°$, $b=5cm$ and $c=19cm$. Solve the triangle. Round to the nearest whole number.

6. Determine the length of SR in the given diagram. Round to the nearest whole number.

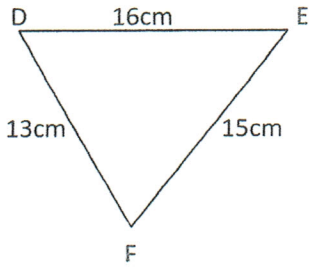


7. Solve each triangle. Round all answers to the nearest whole number.

a.



b.



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EXAM REVIEW

Unit 6: Similar Triangles and Trigonometry Answers

1. $a = 10cm, f = 4cm$

2a. 0.625, 0.530, 0.848 b. 1.664, 0.857, 0.515 c. 0.105, 0.105, 0.995

3. $m = 2.5m, \angle L = 50°, n = 3.9m$

4. 42.5m

5. $\angle A = 75°, a = 18cm, \angle B = 15°$

6. $SR = 76m$

7a. $\angle X = 66°, y = 37cm, z = 61cm$ b. $\angle F = 69°, \angle D = 61°, \angle E = 50°$