PHY2005
Applied Physics II
Spring 2018

Announcements

• Web Page for course:
http://www.phys.ufl.edu/courses/phy2005/spring18/index.html
Or: physics > academics > current courses > phy2005

• Purchase course materials :
Text: Technical Physics, Bueche & Wallach, 4th Ed.
Top Hat access bundled with Secure Test.

• Top Hat graded quizzes start next Wednesday

• Communications:
Canvas – working?
My email: bernard@phys.ufl.edu

Math review

See: Ch. 1 of textbook – Vectors
       Appendix 1 of textbook -- Math Review
       Appendix 2 of textbook -- Trig Functions

Let's work some problems from:

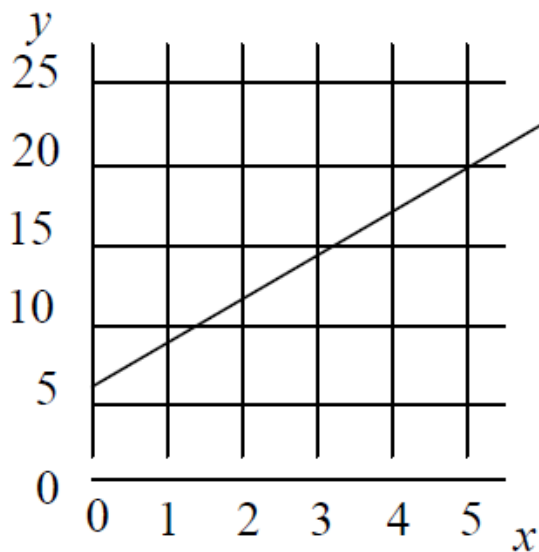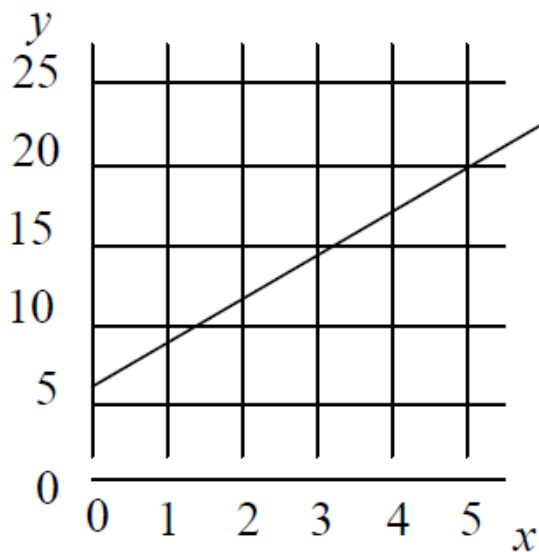[Bryn Mawr College Dept. of Physics Math Readiness Examination for Intro Physics]

Math review

2. A cylinder has a circular cross section of diameter 4 cm (centimeters) and length 5 cm. The volume is approximately

(A) 600 cm^3 (B) 60 cm^3 (C) 6,000 cm^3 (D) 0.6 cm^3 (E) 6 cm^3

4. The area under this line between x = 1 and x = 5 is about

(A)   15
(B)   5
(C)   55
(D)   25
(E)   155

Math review

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4. The area under this line between $x = 1$ and $x = 5$ is about

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(B)   5
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(E)   155

Math review

6. $(2xy^3)^3 =$

(A) $6x^3y^9$ (B) $8x^4y^6$ (C) $8x^4y^6$ (D) $8x^3y^9$ (E) $6x^3y^9$

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8. C3. $\dfrac{4 \times 10^{-15}}{8 \times 10^{-12}} =$

(A) 5×10^{-4} (B) 2×10^{-4} (C) 5×10^{-28} (D) 5×10^{4} (E) 2×10^{-27}

---

9. A13. $\left(\dfrac{x^2}{y}\right) + \left(\dfrac{x}{y^2}\right) =$

(A) $\dfrac{x}{y}$ (B) $\dfrac{y}{x}$ (C) xy (D) $\dfrac{x^2y + x}{y^2}$ (E) $\dfrac{x^2y^2 + xy^2}{x^2y^2}$

Math review

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Math review

18. $\dfrac{2x}{3y} \bullet \dfrac{9y}{4x^2} =$

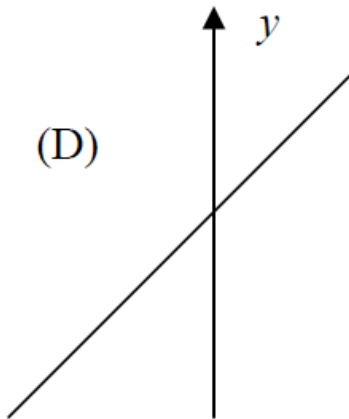(A) $6xy$ (B) $\dfrac{3y}{2x}$ (C) $\dfrac{8x^3}{9y^2}$ (D) $\dfrac{3}{2x}$ (E) $\dfrac{8x^3}{9y^2}$

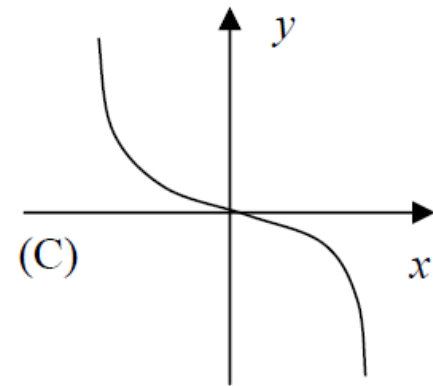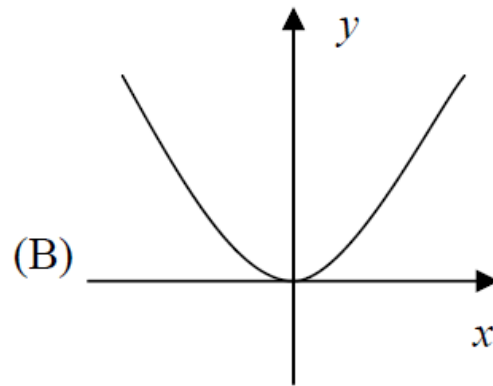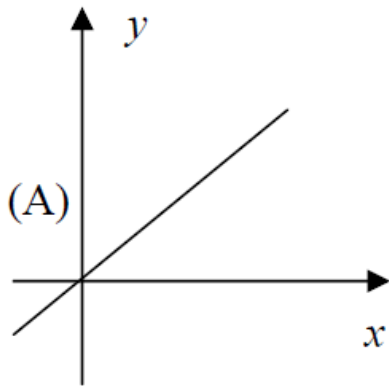
20. $ln(ab) =$

(A) 10^{ab} (B) e^{ab} (C) $e^{(a+b)}$ (D) $ln(a)+ln(b)$ (E) $a\,ln(b)$

Math review

18. $\dfrac{2x}{3y} \bullet \dfrac{9y}{4x^2} =$

(A) $6xy$

(B) $\dfrac{3y}{2x}$

(C) $\dfrac{8x^3}{9y^2}$

(D) $\dfrac{3}{2x}$

(E) $\dfrac{8x^3}{9y^2}$

---

20. $ln(ab) =$

(A) 10^{ab}

(B) e^{ab}

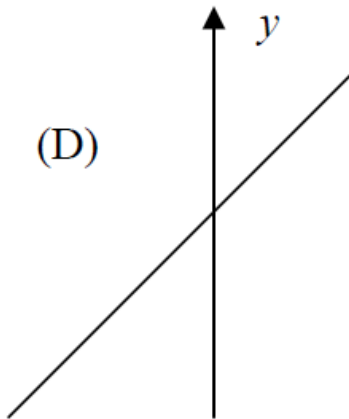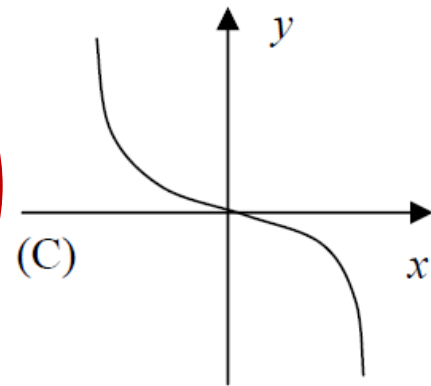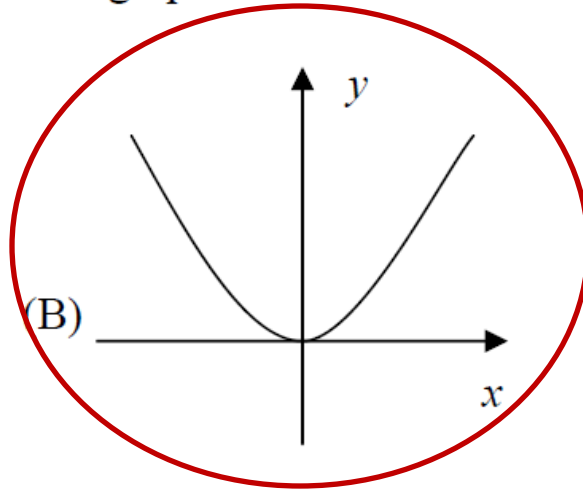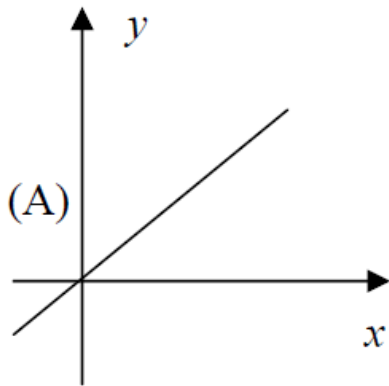(C) $e^{(a+b)}$

(D) $ln(a)+ln(b)$

(E) $a\,ln(b)$

Math review

27. Definition: A function is *even* if $f(-x) = f(x)$ for each x in the domain of f. Which of the functions whose graphs are shown is even?

(A)

(B)

(C)

(D)

(E)

Math review

27. Definition: A function is *even* if $f(-x) = f(x)$ for each x in the domain of f. Which of the functions whose graphs are shown is even?

Math review

30. The y-coordinate of the intersection of the graphs of $x - 2y = 6$ and $x + y = -3$ is

(A) –3 (B) –2 (C) –1 (D) 1 (E) 3

---

31. $8^{-1/3} 9^{1/2} =$

(A) 6 (B) –6 (C) $(72)^{-\frac{1}{6}}$ (D) $\frac{2}{3}$ (E) $\frac{3}{2}$

---

32. $\sqrt[3]{-27} =$

(A) –9 (B) –3 (C) 3 (D) 9 (E) 54

Math review

30. The y-coordinate of the intersection of the graphs of $x - 2y = 6$ and $x + y = -3$ is

(A) –3   (B) –2   (C) –1   (D) 1   (E) 3

---

31. $8^{-1/3} 9^{1/2} =$

(A) 6   (B) –6   (C) $(72)^{-\frac{1}{6}}$ (D) $\dfrac{2}{3}$ (E) $\dfrac{3}{2}$

---

32. $\sqrt[3]{-27} =$
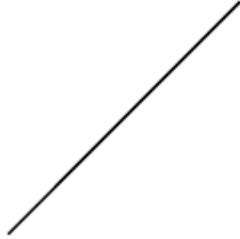
(A) –9   (B) –3   (C) 3   (D) 9   (E) 54

Math review

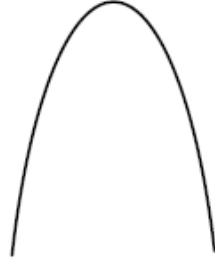33. Which of the following best resembles the graph of $y = \dfrac{1}{2}x^2 - 3x + 1$?
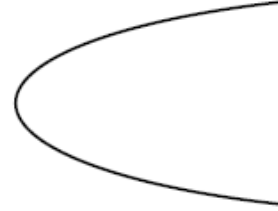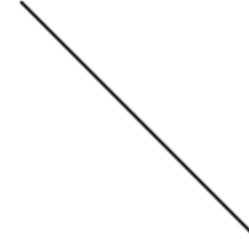
(A) (B) (C) (D) (E)

Math review

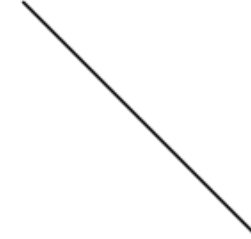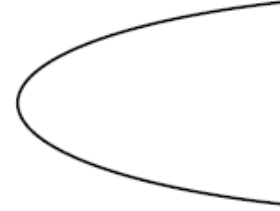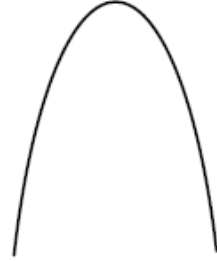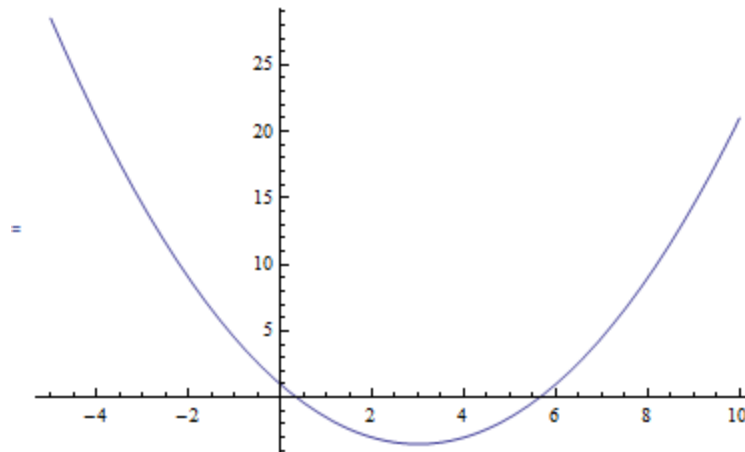33. Which of the following best resembles the graph of $y = \dfrac{1}{2}x^2 - 3x + 1$?

(A)   (B)   (C)   (D)   (E)

Actual plot:

Math review

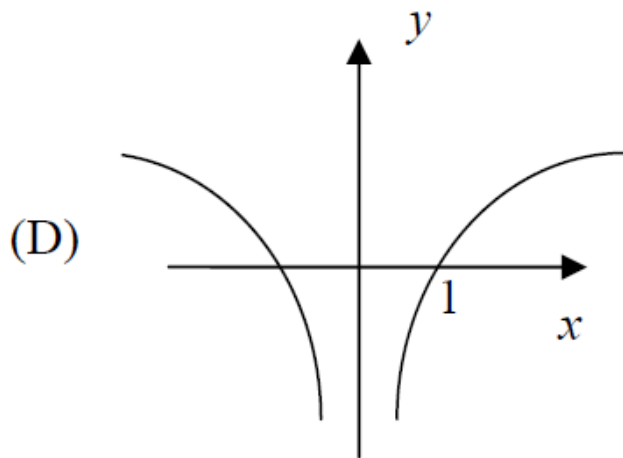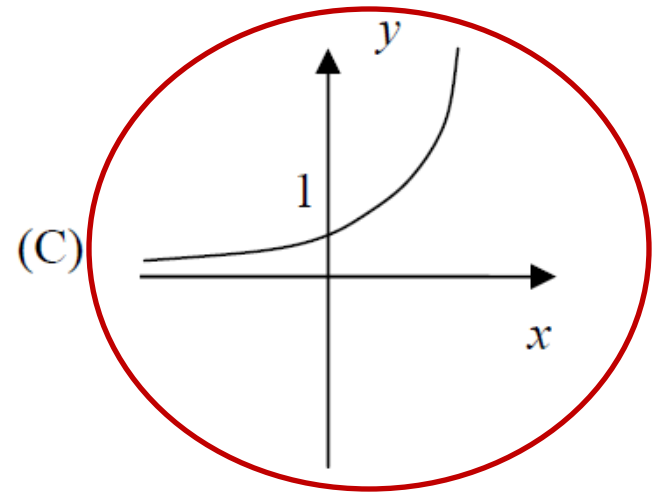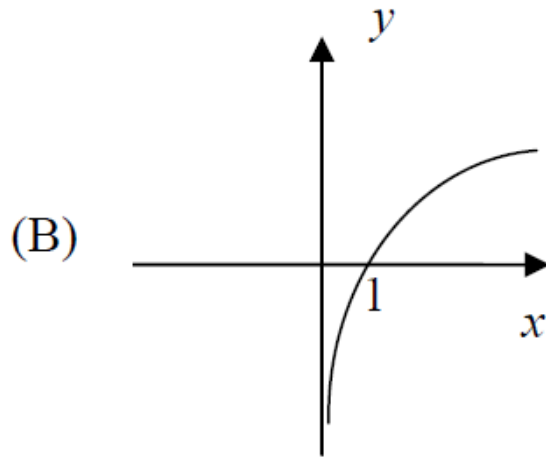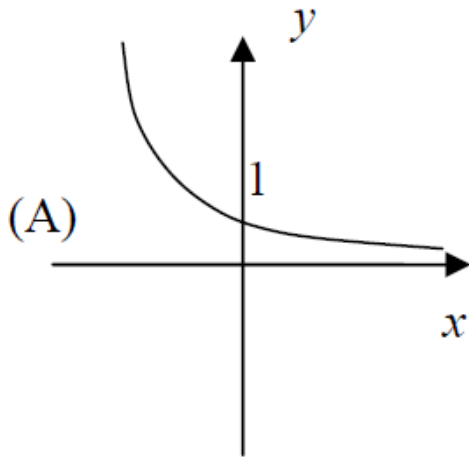36. Which of the following curves best resembles the graph of $f(x) = 3^x$?
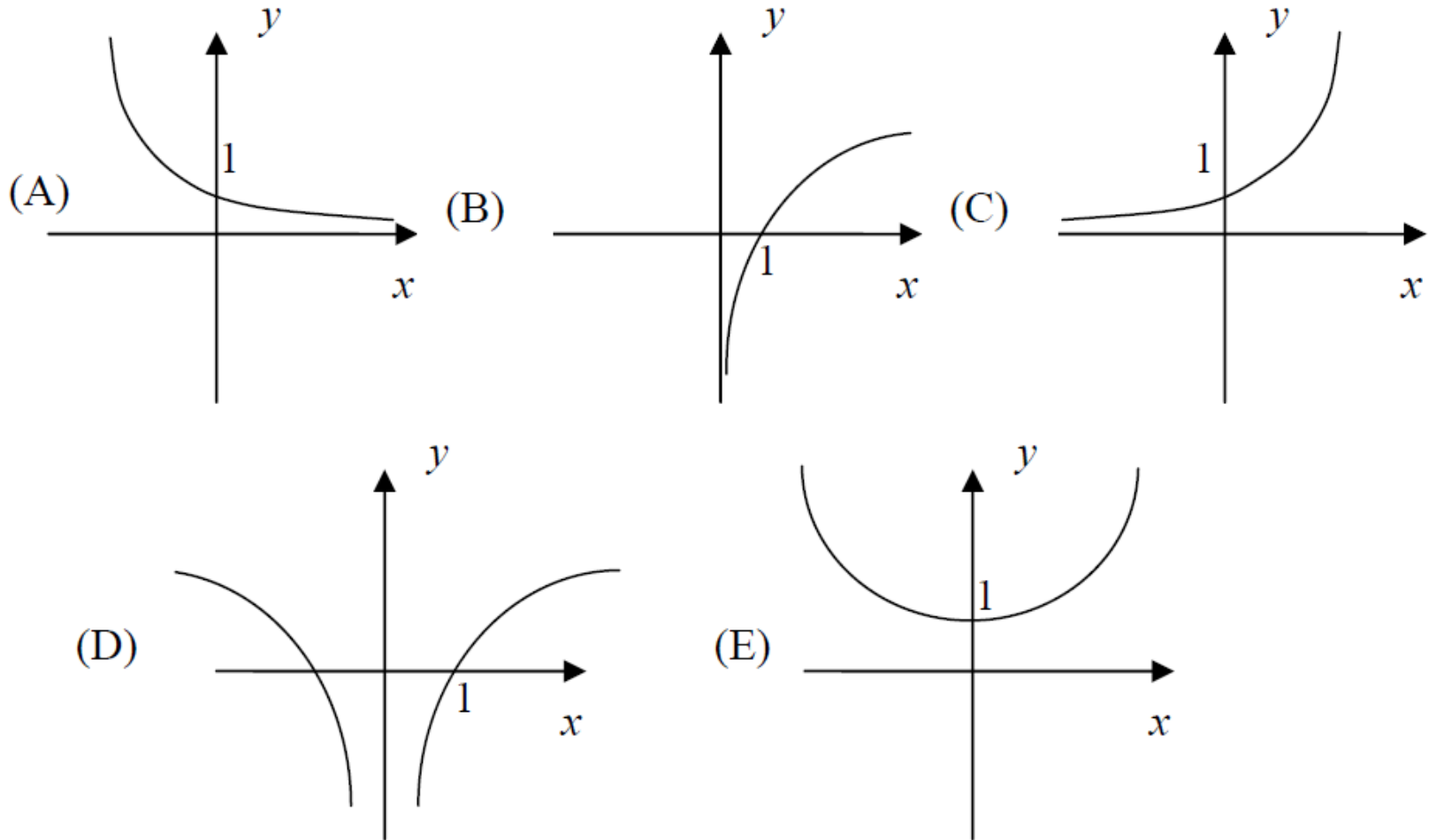
(A)

(B)

(C)

(D)

(E)

Math review

36. Which of the following curves best resembles the graph of $f(x) = 3^x$?
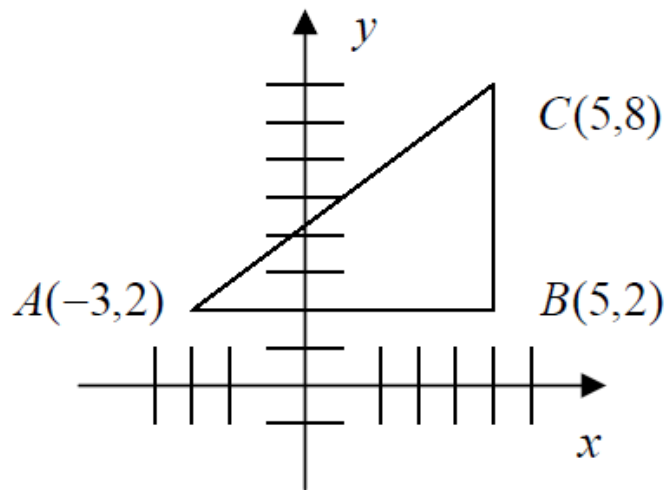

(A)

(B)

(C)

(D)

(E)
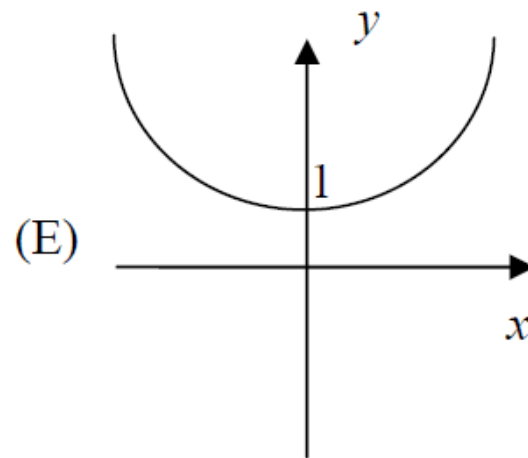
Math review

40. In the given figure, the distance between points A and C is

(A) 8
(B) 10
(C) 12
(D) 14
(E) 16

41. If $f(x) = \dfrac{2x+6}{x+2}$, then $f(a+2) =$

(A) $\dfrac{5}{2}$

(B) $\dfrac{2a+8}{a+4}$

(C) $\dfrac{2a+10}{a+4}$

(D) $\dfrac{2a+6}{a+2}$

(E) $\dfrac{2a+6}{a+4}$

Math review

40. In the given figure, the distance between points A and C is

(A)   8
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(C)   12
(D)   14
(E)   16

$C(5,8)$
$A(-3,2)$ $B(5,2)$

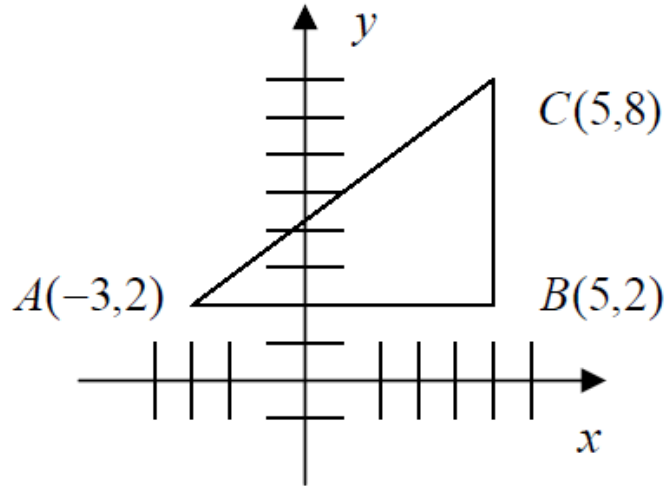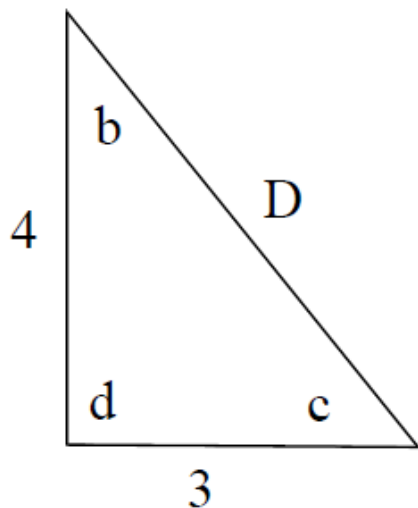
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Math review

52. In the triangle shown, $sin(b) =$

(A) 1.2
(B) 1.33
(C) 0.75
(D) 0.8
(E) 0.6

---

53. $|x - 2| \leq 1$ is equivalent to

(A) $x \geq 3$ (B) $x \leq 1$ (C) $-3 \leq x \leq -1$ (D) $1 \leq x \leq 3$ (E) $-3 \leq x \leq 3$

Math review

52. In the triangle shown, $sin(b) =$
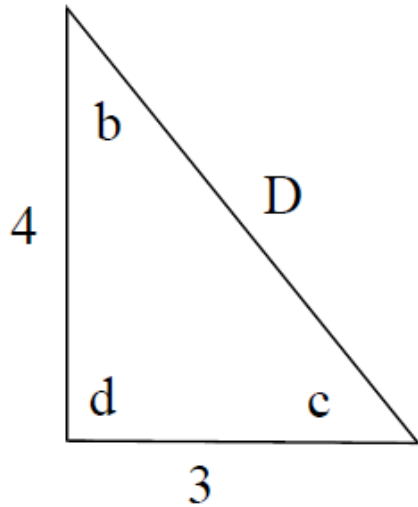

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(C) 0.75
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(E) 0.6

---

53. $|x - 2| \leq 1$ is equivalent to

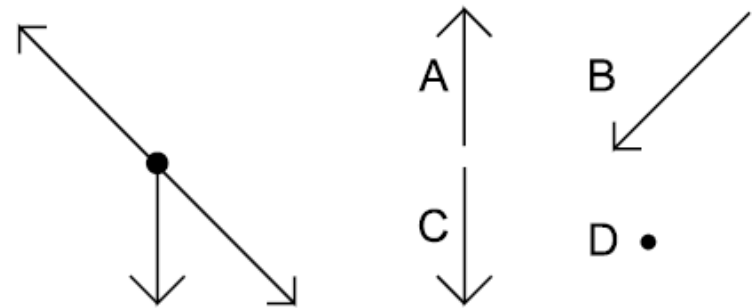(A) $x \geq 3$ (B) $x \leq 1$ (C) $-3 \leq x \leq -1$ (D) $1 \leq x \leq 3$ (E) $-3 \leq x \leq 3$

Math review

Vectors

16. Three force vectors act simultaneously on a body as shown at right. Which is the resultant force?

17. A girl runs west at a constant speed of 3 m/s for one minute and then runs east at the same speed for one minute. What is the magnitude of her average velocity?
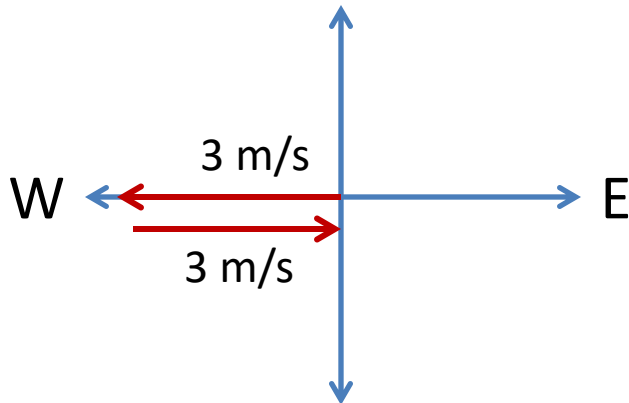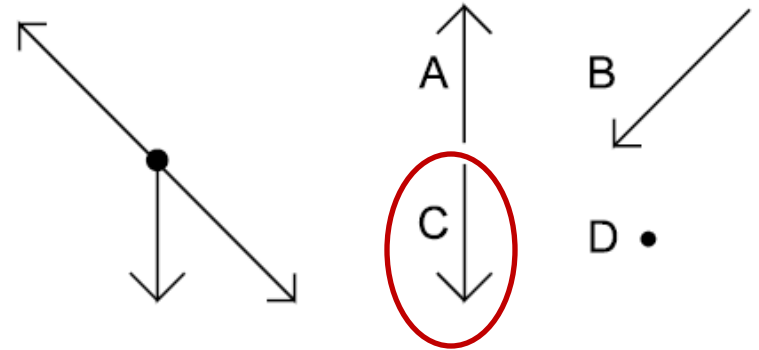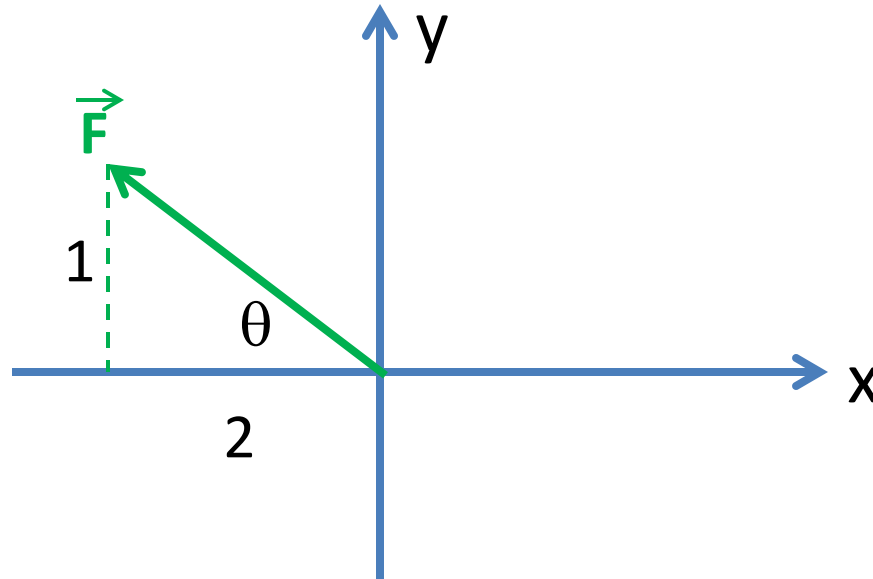
Math review

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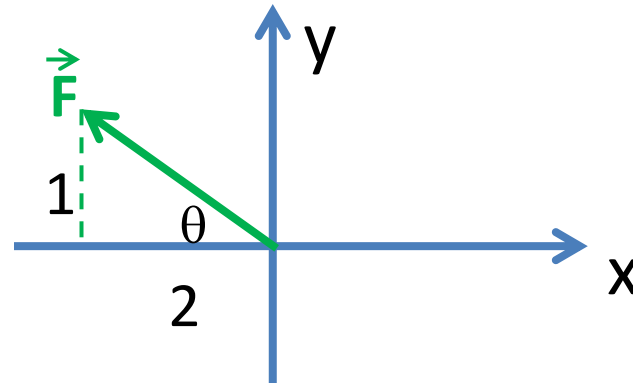
$$v_{avg} = \frac{\text{distance}}{\text{time}} = \frac{(-3\,\text{m/s})(1\,\text{min}) + (3\,\text{m/s})(1\,\text{min})}{1\,\text{min} + 1\,\text{min}} = 0$$

W 3 m/s   3 m/s   E

A   B   C   D

Math review

1. Write the vector $\vec{F}$ shown in component notation.
2. What is the magnitude of the vector?
3. What is the angle θ shown?
4. Express the x and y components in terms of the magnitude F of $\vec{F}$

Math review

1. Write the vector $\vec{F}$ shown in component notation.
2. What is the magnitude of the vector?
3. What is the angle θ shown?
4. Express the x and y components in terms of the magnitude F of $\vec{F}$

$\vec{F}$ = (-2,1)

$$F = \sqrt{(-2)^2 + (1)^2} = \sqrt{5}$$

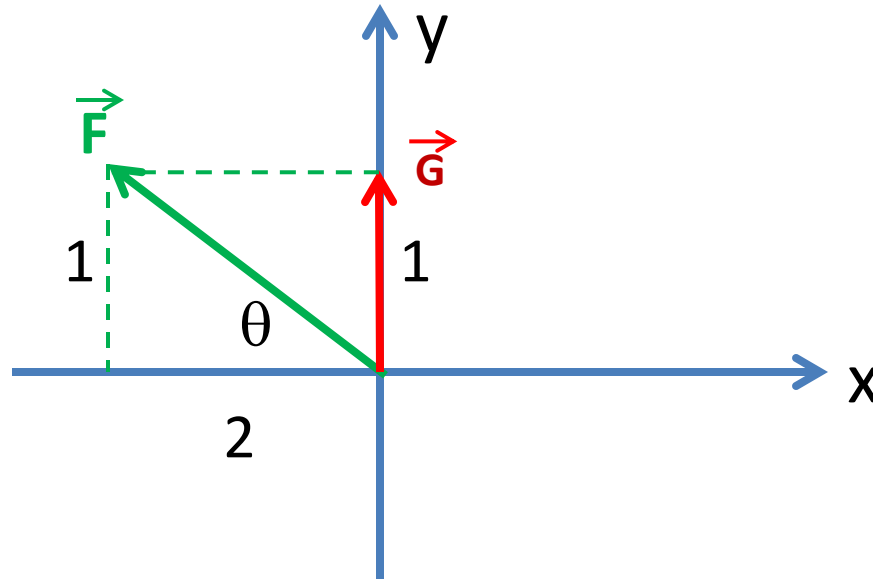$$\theta = \arctan(\frac{1}{2}) = 0.464 \, Rad$$

$$F_y = F\sin\theta = 1$$

$$F_x = F\cos\theta = 2 \, ??? \quad Should \, be -2 \, !$$

NB: to use formulas should measure θ from +x axis.

Math review

1. Write the vector $\vec{F}+\vec{G}$ shown in a) component notation b) using a picture showing the resultant.
   Do the same for $\vec{F}-\vec{G}$
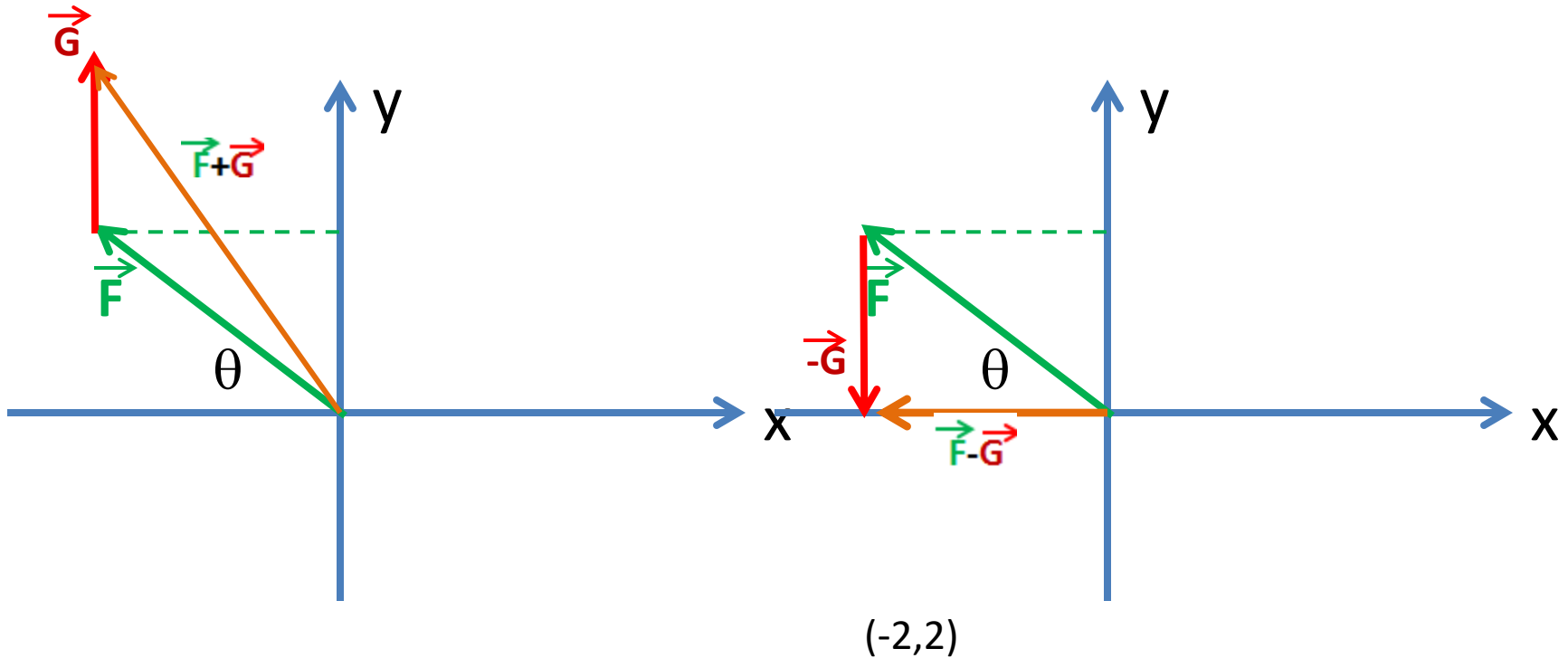2. What is the magnitude of the vector $\vec{F}+\vec{G}$? $\vec{F}-\vec{G}$?

Math review

(-2,2)

1. Write the vector $\vec{F}+\vec{G}$ shown in a) component notation b) using a picture showing the resultant.
   Do the same for $\vec{F}-\vec{G}$
2. What is the magnitude of the vector $\vec{F}+\vec{G}$? $\vec{F}-\vec{G}$?