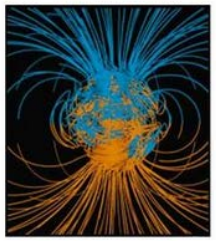


PHY2005
Applied Physics II
Spring 2017

Announcements

- Web Page for course:

http://www.phys.ufl.edu/~pjh/teaching/phy2005/

Or: physics > academics > current courses > phy2005

- Purchase course materials :

  Text: Technical Physics, Bueche & Wallach, 4th Ed.

  HITT remote "clicker". See Physics Dept. HITT page.

- HITT graded quizzes start Monday

- Communications:

  Listserv – working?

  My email: pjh@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

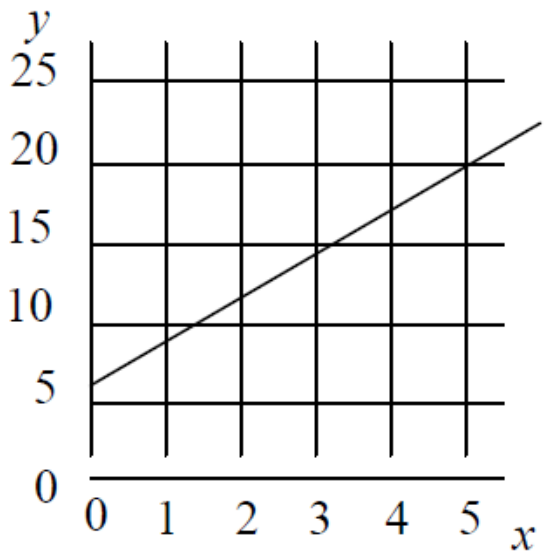
Math review

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



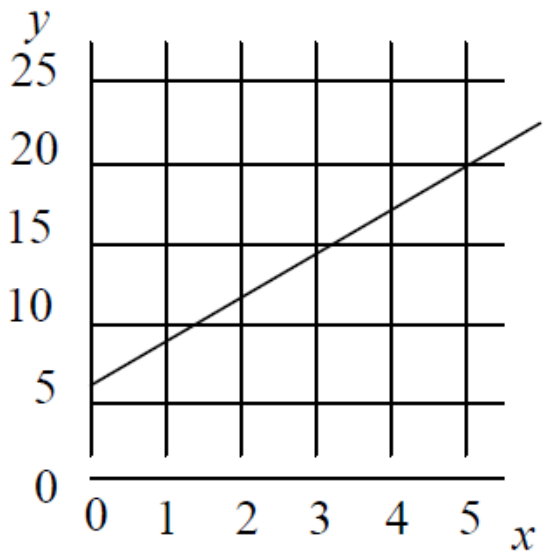
Math review

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

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

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

---

8. C3. $\dfrac{4\times10^{-15}}{8\times10^{-12}} =$

(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

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

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

---

8. $\dfrac{4\times10^{-15}}{8\times10^{-12}} =$

(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

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

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

---

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

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

---

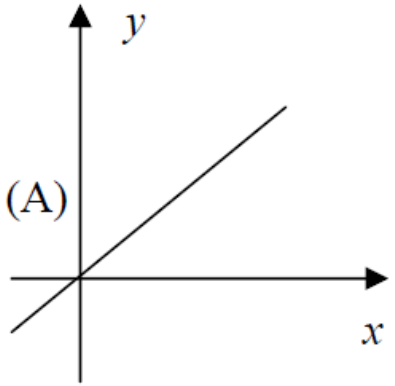
20. $ln(ab) =$

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

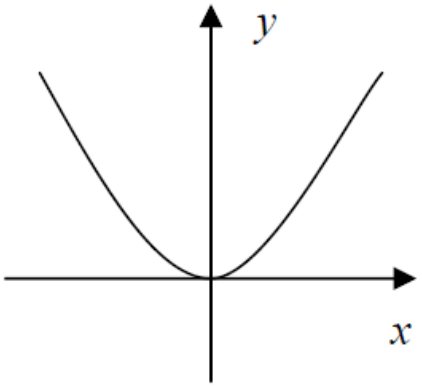
Math review

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?

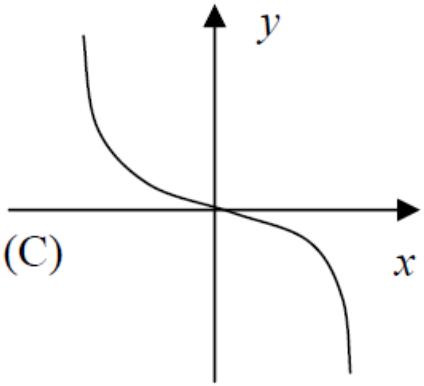
(A)



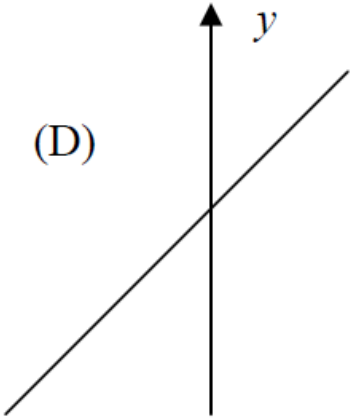
(B)



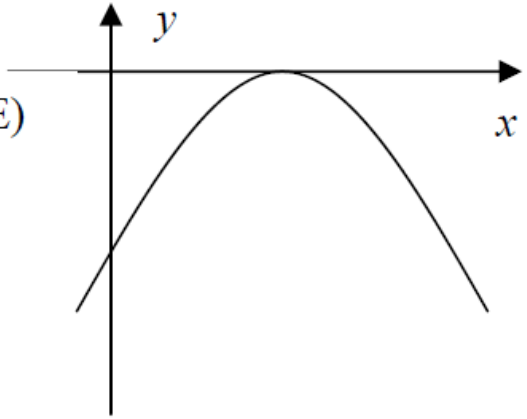
(C)



(D)

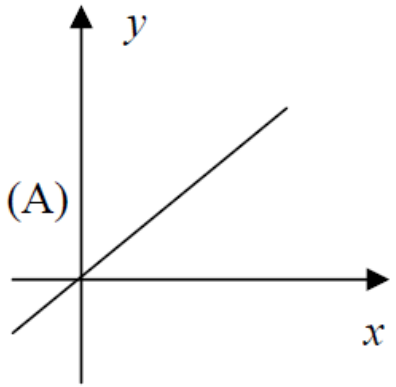


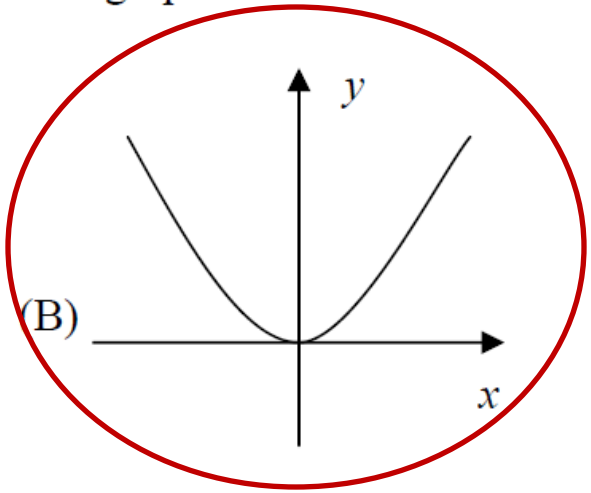
(E)

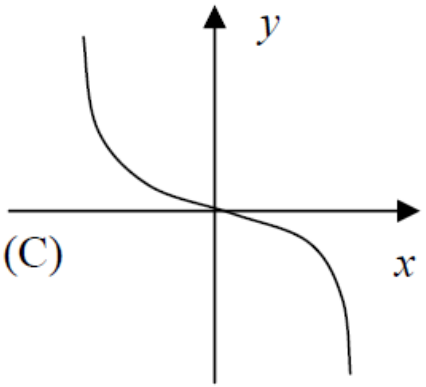


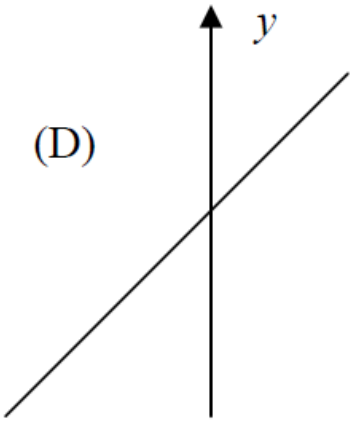
Math review

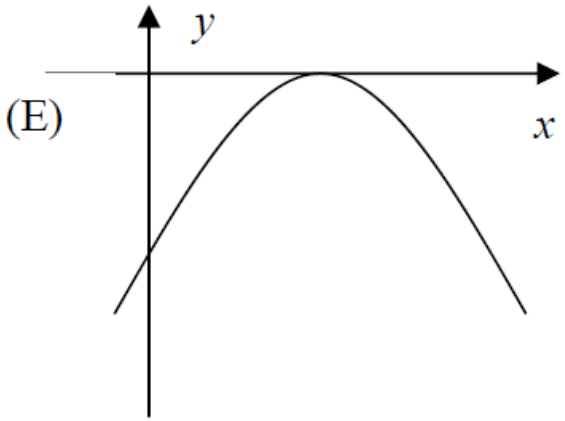
27. Definition: A function is *even* if $f(-x) = f(x)$ for each x in the domain of f. Which of the functions whose graphs are shown is even?











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) $\frac{2}{3}$ (E) $\frac{3}{2}$

---

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

(A) -9 (B) -3 (C) 3 (D) 9 (E) 54

Math review

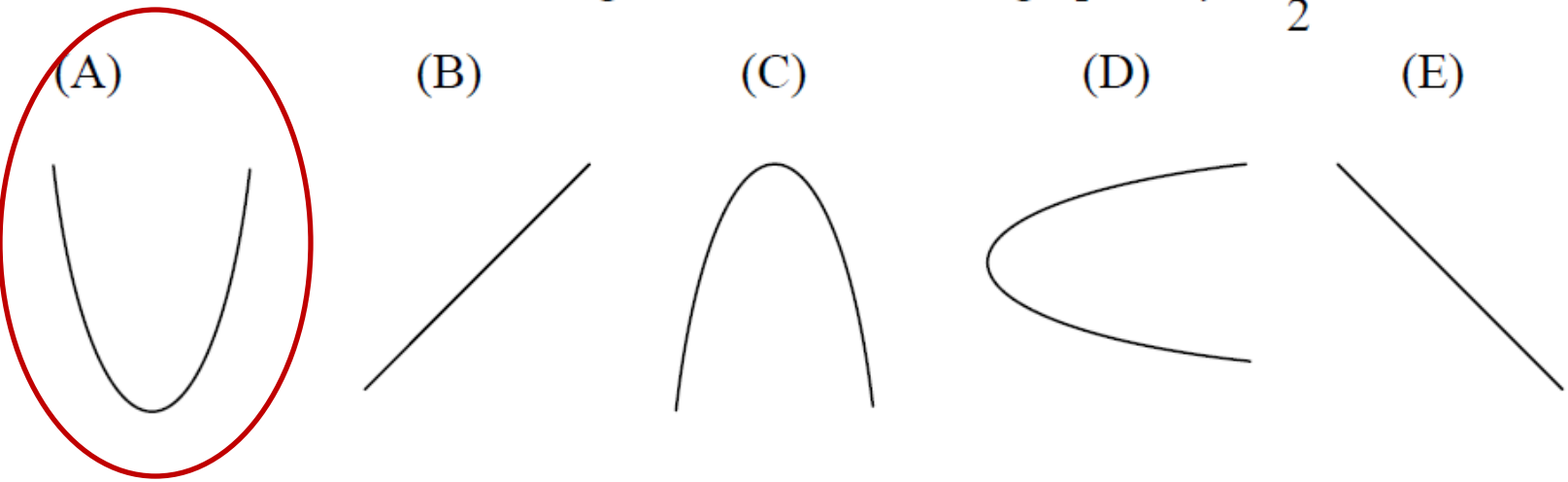
33. Which of the following best resembles the graph of $y = \frac{1}{2}x^2 - 3x + 1$?

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

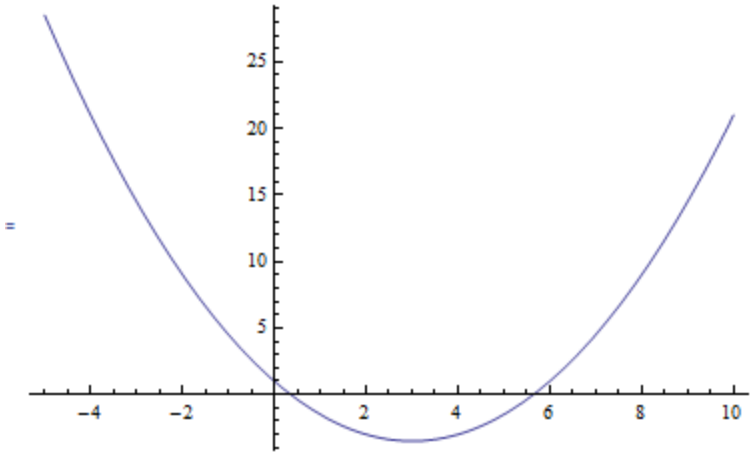
Math review

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

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



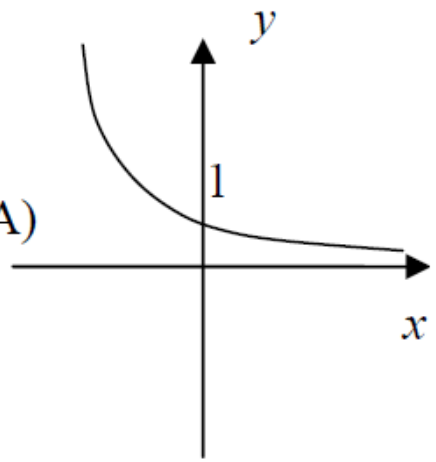
Actual plot:



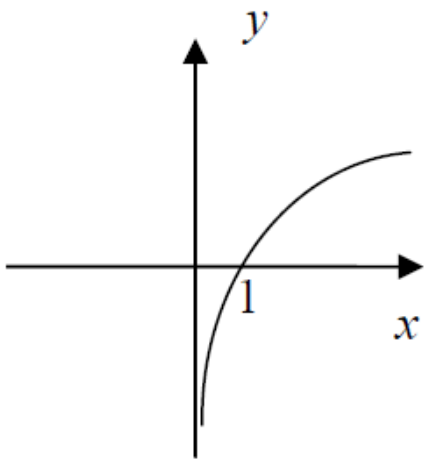
Math review

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

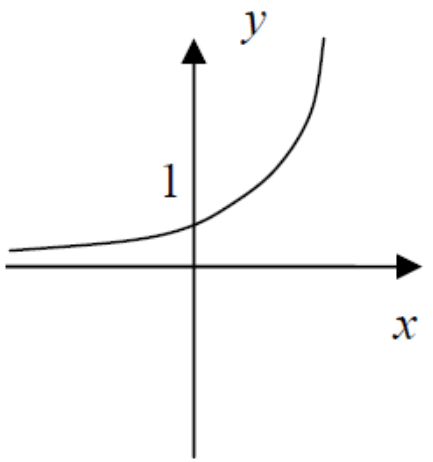
(A)



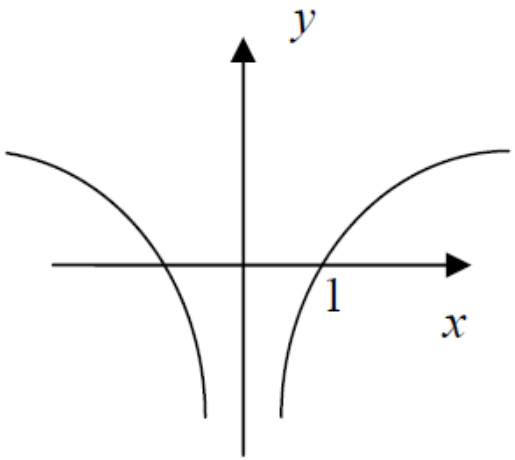
(B)



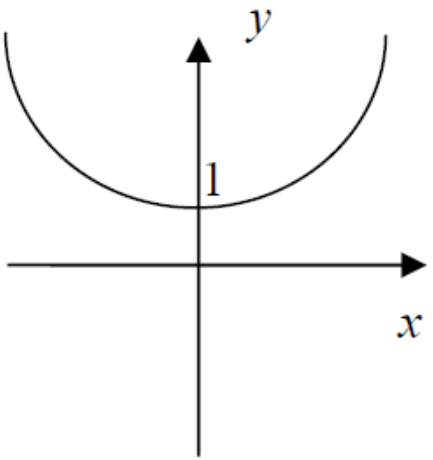
(C)



(D)



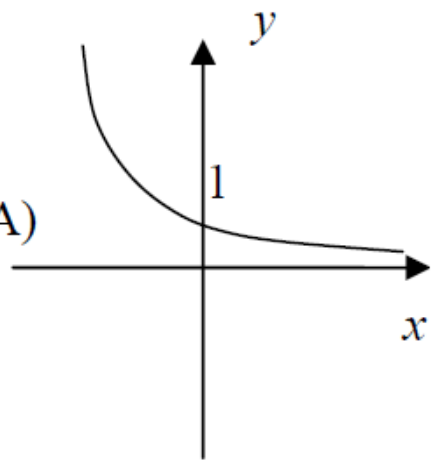
(E)



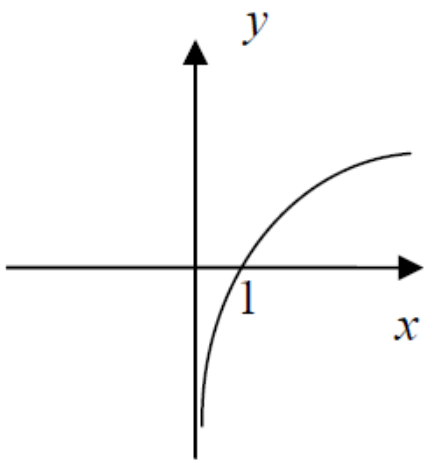
Math review

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

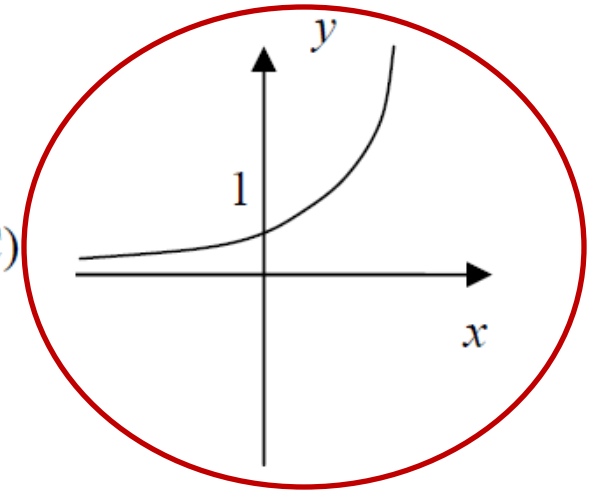
(A)



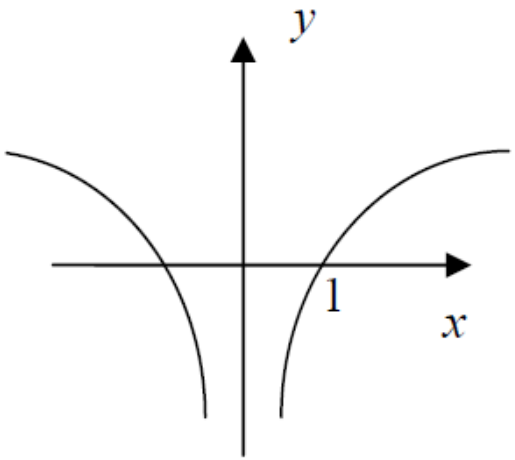
(B)



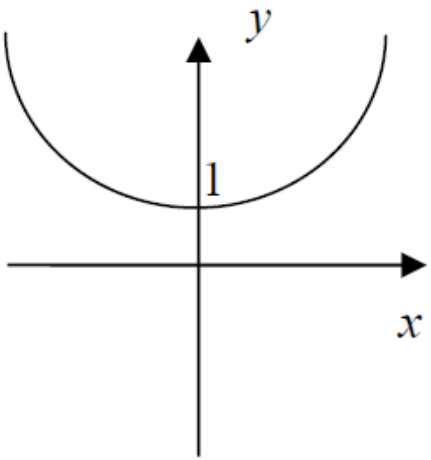
(C)



(D)



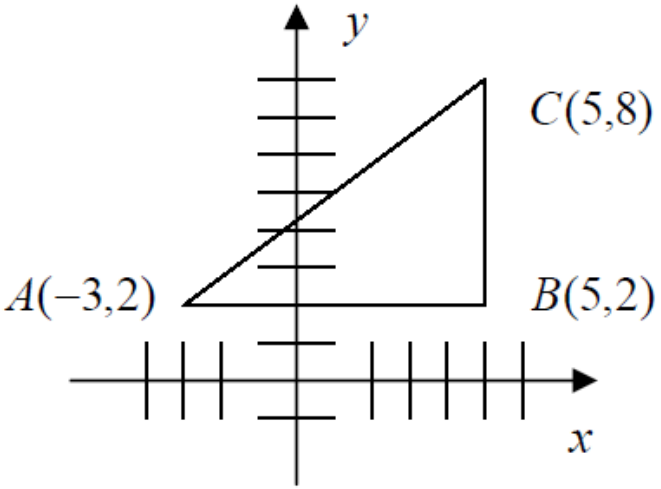
(E)



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



---

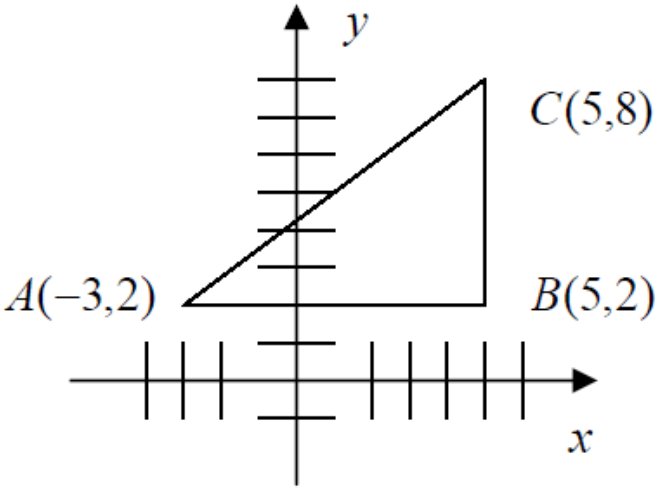
41. If $f(x) = \dfrac{2x+6}{x+2}$, then $f(a+2) =$

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



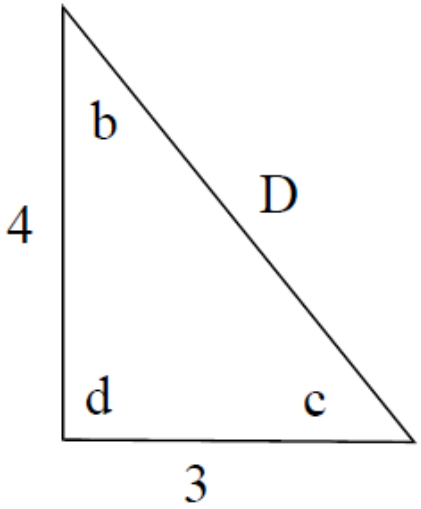
---

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

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



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

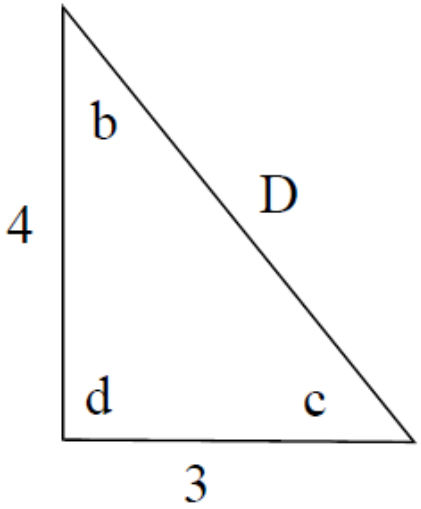
---

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

(A) $x \ge 3$ (B) $x \le 1$ (C) $-3 \le x \le -1$ (D) $1 \le x \le 3$ (E) $-3 \le x \le 3$

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. $|x-2| \le 1$ is equivalent to

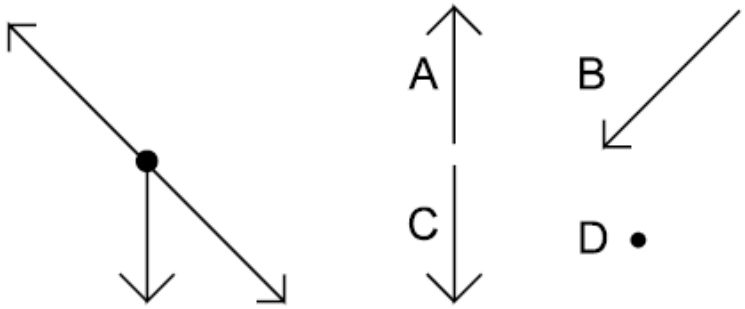
(A) $x \ge 3$ (B) $x \le 1$ (C) $-3 \le x \le -1$ (D) $1 \le x \le 3$ (E) $-3 \le x \le 3$

Math review

Vectors

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

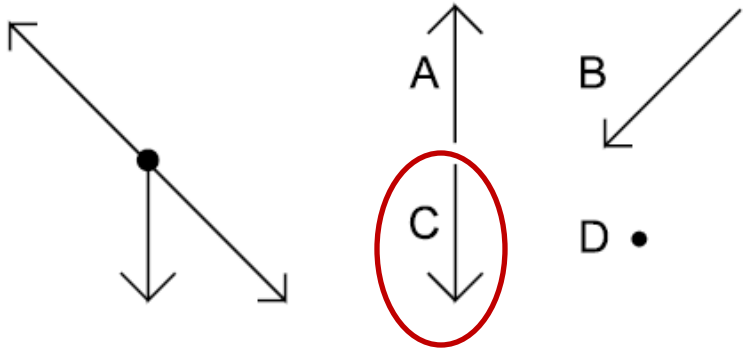
17. A girl runs west at a constant speed of 3 m/s for one minute and then runs east at the same speed for one minute. What is the magnitude of her average velocity?



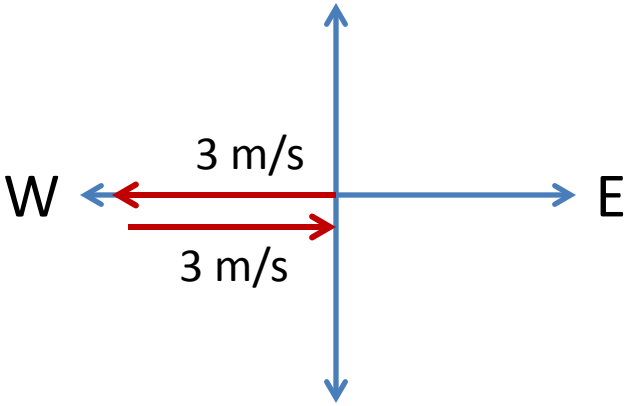
Math review

Vectors

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

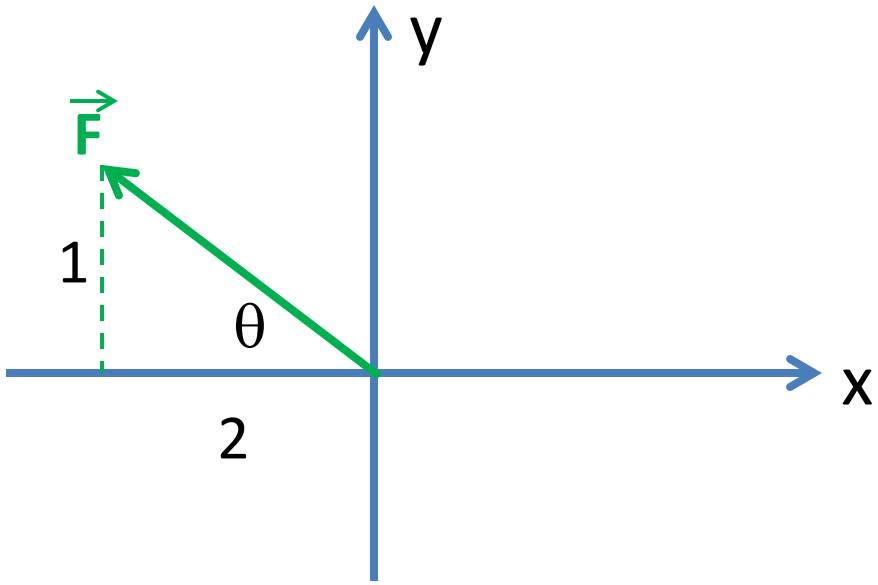


17. A girl runs west at a constant speed of 3 m/s for one minute and then runs east at the same speed for one minute. What is the magnitude of her average velocity?



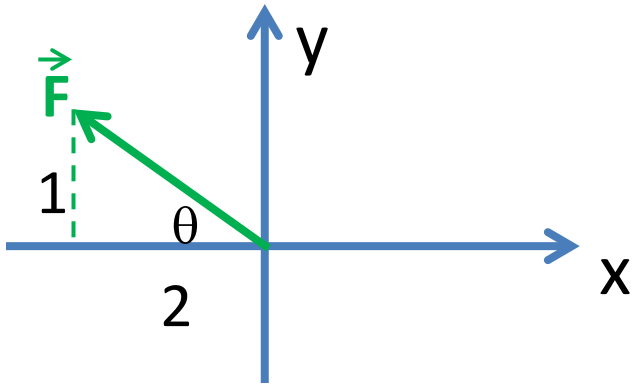
$$v_{avg} = \frac{\text{distance}}{\text{time}} = \frac{(-3\,\text{m/s})(1\,\text{min}) + (3\,\text{m/s})(1\,\text{min})}{1\,\text{min} + 1\,\text{min}} = 0$$

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

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

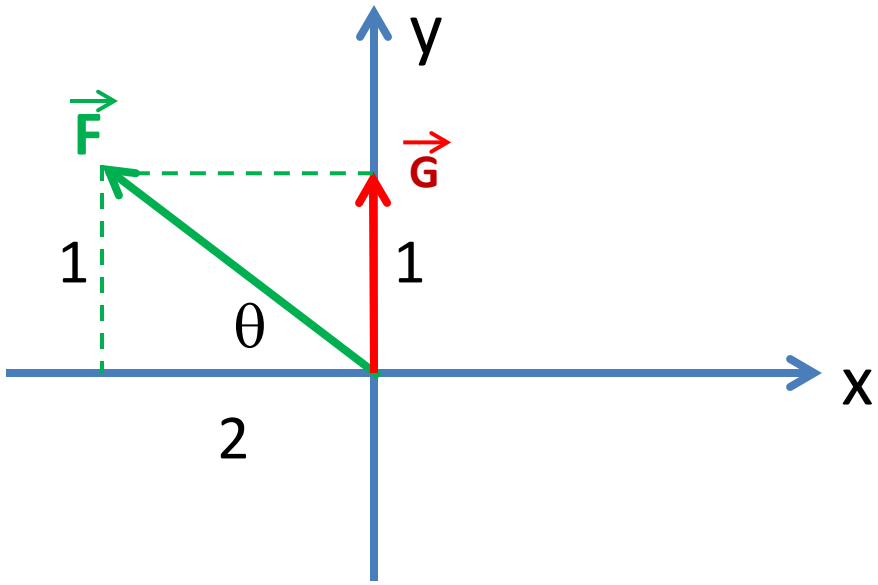
$$\theta = \arctan(\frac{1}{2}) = 0.464\, Rad$$

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

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

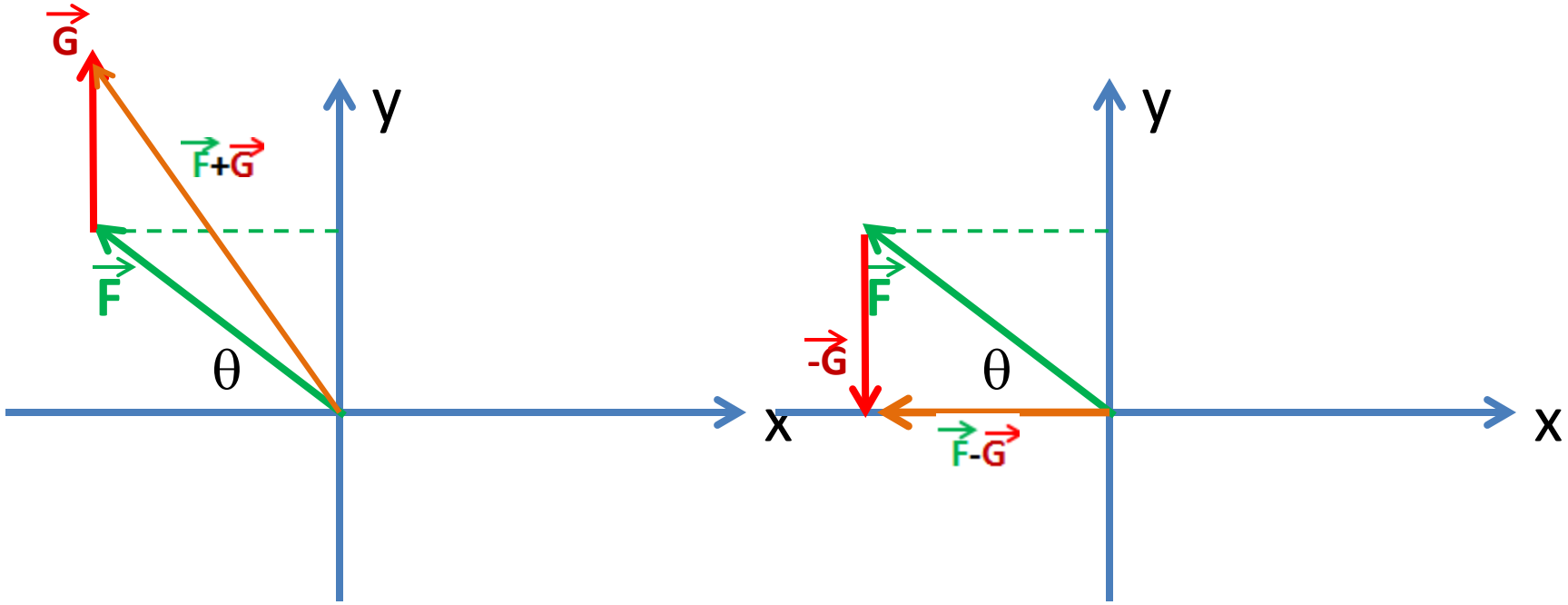
NB: to use formulas should measure θ from +x axis.

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 $\vec{F}-\vec{G}$ (-2,0)
2. What is the magnitude of the vector $\vec{F}+\vec{G}$? $\vec{F}-\vec{G}$?