

## PART A

1. Write  $5A/(2 + (1/3))$  as a single fraction times  $A$ .
2. Multiply out  $(2a - 5)^2$  and collect terms.
3. Solve  $10x - 5 = 17$  for  $x$ .
4. Solve  $6/x = 3/8$  for  $x$ .
5. If  $a = 3$  and  $b = -4$ , find the value of  $5ab - 3(a^2b)$ .
6. Write  $3x - 6 < -5x + 10$  in an equivalent form  $x < C$  or  $x > C$  for a suitable constant  $C$ .
7. If  $9A = 5(C - 32)$  and  $A = 100$ , find  $C$ .
8. Give the slope of the line through the points  $(0,3)$  and  $(5,0)$ .
9. Multiply out  $t(t^2 - 3)^2$  and write the answer as a polynomial in  $t$ .
10. Simplify  $(8s^2 + 2s)/2s$  as much as possible.
11. Suppose that the price of a gallon of goo is now  $G$  dollars, and that if the price increases by 50%, then the price will be \$60. Find  $G$ .
12. Combine the factors of  $(-3x^2y^5)(2xy^3)$  into the form  $Cx^ay^b$ .

## PART B

1. Simplify  $((x + 2)/(x^2 - 9)) \cdot ((25x + 75)/(5x + 10))$  as much as possible.
2. If  $22M = 4 - 2x$ , for which values of  $x$  is  $M \geq 11$ ?
3. Solve  $|7 - x| = 4$  for  $x$ .
4. Factor  $3z(5z + 2) - 3z(z - 7)$  completely.
5. Find all values of  $d$  that satisfy  $2d^4 = 10d^3$ .
6. Suppose that  $xy \neq 0$ . Write  $(5y^2/x^3)^{-2}$  in the form  $Cx^ay^b$ .

7. Solve  $1/(2x - 3) - 1 = x/(2x - 3)$  for  $x$ .
8. The rent for a piece of equipment is \$12 per hour for the first two hours and \$9 per hour after that. How long can the equipment be rented for \$60? What is the average cost per hour for the full rental period?
9. A given rectangle has length  $L$  and width  $W$ . Its area is at most 100 square inches, and its length is 24 inches greater than its width. Write equations or inequalities that describe these two conditions.
10. Suppose that  $x > 0$  and  $y > 0$ . Write  $\sqrt{9y^5/x^4}$  in the form  $Cx^a y^b$ .

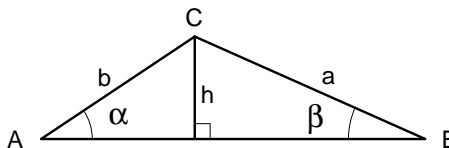
## PART C

Here and in Part D  $\log$  means logarithm to the base 10 and  $\ln$  means logarithm to the base  $e$ .

1. Solve  $(x - 5)x = 6$  for  $x$ .
2. Find all values of  $a$  such that  $(a^2 - 4)(a + 2)/(a - 2) = 0$ .
3. Solve  $L = F/(r + t)$  for  $r$  in terms of  $L$ ,  $F$  and  $t$ .
4. Suppose that  $a \neq 0$ . Simplify  $((y + a)^2 - y^2)/a$  as much as possible.
5. Find and describe all solutions  $x$  of the inequality  $(3x - 5)(x + 4) > 0$ .
6. Find all the solutions  $z$  of  $(\sqrt{z})^2 - \sqrt{z} - 6 = 0$ .
7. Suppose that  $f(x) = x^3 + 2x$  and that  $h$  is constant. Write  $f(x + h)$  as a polynomial in  $x$ .
8. The height above ground in feet of a blob  $t$  seconds after it is dropped from a cliff is given by the function  $h(t) = 144 - 16t^2$ . After how many seconds will the blob strike the ground? How high is the cliff?
9. The size  $S(t)$  of a lump at time  $t$  is given by  $S(t) = S_0 e^{kt}$ , where  $S_0$  and  $k$  are constants. If  $S(1) = 5S_0$ , find the value of  $t$  for which  $S(t) = 125S_0$ .
10. If  $x > 0$ ,  $y > 0$  and  $\log(xy^2) = 20$ , find  $\log y$  in terms of  $\log x$ .

## PART D

1. Find  $\cos^2 2x + \sin^2 2x$ .
2. Solve  $\log(b/7) - \log 2A + \log 7 = 0$  for  $b$  in terms of  $A$ .
3. Solve  $5e^{x-1} = 2y$  for  $x$  in terms of  $y$ .
4. Write  $\sin(x - (3\pi/2))$  in terms of  $\sin x$  and  $\cos x$ .
5. If the point  $(5, -4)$  is on the terminal side of the angle  $\theta$  in standard position, find  $\sin \theta$  and  $\cos \theta$ .
6. Find  $a$  in terms of  $\alpha$ ,  $\beta$ ,  $b$  and  $h$  for the triangle ABC shown.



7. If  $\cos x = 2/5$  and  $0 < x < \pi/2$ , find  $\tan x$ .
8. Describe the graph of the function  $f(x + 2) + 5$  in terms of the graph of  $f(x)$ .