ECN 3321 Mortgage payment calculation practice questions

Calculate the monthly payment for a home morgage with these characteristics. In each case, assume the amount borrowed is $P = 350,000$.

1. number of years to make the mortgage payments $= 10.0$; market interest rate $= 0.03$.

2. number of years to make the mortgage payments $= 10.0$; market interest rate $= 0.05$.

3. number of years to make the mortgage payments $= 10.0$; market interest rate $= 0.06$.

4. number of years to make the mortgage payments $= 10.0$; market interest rate $= 0.08$.

5. number of years to make the mortgage payments $= 10.0$; market interest rate $= 0.09$.

6. number of years to make the mortgage payments $= 15.0$; market interest rate $= 0.03$.

7. number of years to make the mortgage payments $= 15.0$; market interest rate $= 0.05$.

8. number of years to make the mortgage payments $= 15.0$; market interest rate $= 0.06$.

9. number of years to make the mortgage payments $= 15.0$; market interest rate $= 0.08$.

10. number of years to make the mortgage payments $= 15.0$; market interest rate $= 0.09$.

11. number of years to make the mortgage payments $= 20.0$; market interest rate $= 0.03$.

12. number of years to make the mortgage payments $= 20.0$; market interest rate $= 0.05$.

13. number of years to make the mortgage payments $= 20.0$; market interest rate $= 0.06$.

14. number of years to make the mortgage payments = 20.0; market interest rate = 0.08.

15. number of years to make the mortgage payments = 20.0; market interest rate = 0.09.

16. number of years to make the mortgage payments = 25.0; market interest rate = 0.03.

17. number of years to make the mortgage payments = 25.0; market interest rate = 0.05.

18. number of years to make the mortgage payments = 25.0; market interest rate = 0.06.

19. number of years to make the mortgage payments = 25.0; market interest rate = 0.08.

20. number of years to make the mortgage payments = 25.0; market interest rate = 0.09.

21. number of years to make the mortgage payments = 30.0; market interest rate = 0.03.

22. number of years to make the mortgage payments = 30.0; market interest rate = 0.05.

23. number of years to make the mortgage payments = 30.0; market interest rate = 0.06.

24. number of years to make the mortgage payments = 30.0; market interest rate = 0.08.

25. number of years to make the mortgage payments = 30.0; market interest rate = 0.09.

Answers

1. $n = 12 \times 10.0 = 120$; $r = \frac{0.03}{12} = 0.00250$;

   C = monthly payment on mortgage:

   $$C = (0.00250 \times 350,000) \left(\frac{(1 + 0.00250)^{120}}{(1 + 0.00250)^{120} - 1} \right)$$

   $$C = (875.00000) \left(\frac{1.34935}{1.34935 - 1} \right)$$

   $$C = 3,379.63$$

2. $n = 12 \times 10.0 = 120$; $r = \frac{0.05}{12} = 0.00417$;

   C = monthly payment on mortgage:

   $$C = (0.00417 \times 350,000) \left(\frac{(1 + 0.00417)^{120}}{(1 + 0.00417)^{120} - 1} \right)$$

   $$C = (1,458.33333) \left(\frac{1.64701}{1.64701 - 1} \right)$$

   $$C = 3,712.29$$

3. $n = 12 \times 10.0 = 120$; $r = \frac{0.06}{12} = 0.00500$;

   C = monthly payment on mortgage:

   $$C = (0.00500 \times 350,000) \left(\frac{(1 + 0.00500)^{120}}{(1 + 0.00500)^{120} - 1} \right)$$

   $$C = (1,750.00000) \left(\frac{1.81940}{1.81940 - 1} \right)$$

   $$C = 3,885.72$$

4. $n = 12 \times 10.0 = 120$; $r = \frac{0.08}{12} = 0.00667$;

C = monthly payment on mortgage:

$$C = (0.00667 \times 350,000)\left(\frac{(1+0.00667)^{120}}{(1+0.00667)^{120}-1}\right)$$

$$C = (2,333.33333)\left(\frac{2.21964}{2.21964-1}\right)$$

$$C = 4,246.47$$

5. $n = 12 \times 10.0 = 120$; $r = \frac{0.09}{12} = 0.00750$;

C = monthly payment on mortgage:

$$C = (0.00750 \times 350,000)\left(\frac{(1+0.00750)^{120}}{(1+0.00750)^{120}-1}\right)$$

$$C = (2,625.00000)\left(\frac{2.45136}{2.45136-1}\right)$$

$$C = 4,433.65$$

6. $n = 12 \times 15.0 = 180$; $r = \frac{0.03}{12} = 0.00250$;

C = monthly payment on mortgage:

$$C = (0.00250 \times 350,000)\left(\frac{(1+0.00250)^{180}}{(1+0.00250)^{180}-1}\right)$$

$$C = (875.00000)\left(\frac{1.56743}{1.56743-1}\right)$$

$$C = 2,417.04$$

7. $n = 12 \times 15.0 = 180$; $r = \frac{0.05}{12} = 0.00417$;

$C = $ monthly payment on mortgage:

$$C = (0.00417 \times 350,000) \left(\frac{(1 + 0.00417)^{180}}{(1 + 0.00417)^{180} - 1} \right)$$

$$C = (1,458.33333) \left(\frac{2.11370}{2.11370 - 1} \right)$$

$$C = 2,767.78$$

8. $n = 12 \times 15.0 = 180$; $r = \frac{0.06}{12} = 0.00500$;

$C = $ monthly payment on mortgage:

$$C = (0.00500 \times 350,000) \left(\frac{(1 + 0.00500)^{180}}{(1 + 0.00500)^{180} - 1} \right)$$

$$C = (1,750.00000) \left(\frac{2.45409}{2.45409 - 1} \right)$$

$$C = 2,953.50$$

9. $n = 12 \times 15.0 = 180$; $r = \frac{0.08}{12} = 0.00667$;

$C = $ monthly payment on mortgage:

$$C = (0.00667 \times 350,000) \left(\frac{(1 + 0.00667)^{180}}{(1 + 0.00667)^{180} - 1} \right)$$

$$C = (2,333.33333) \left(\frac{3.30692}{3.30692 - 1} \right)$$

$$C = 3,344.78$$

10. $n = 12 \times 15.0 = 180$; $r = \frac{0.09}{12} = 0.00750$;

$C = $ monthly payment on mortgage:

$$C = (0.00750 \times 350,000) \left(\frac{(1 + 0.00750)^{180}}{(1 + 0.00750)^{180} - 1} \right)$$

$$C = (2,625.00000) \left(\frac{3.83804}{3.83804 - 1} \right)$$

$$C = 3,549.93$$

11. $n = 12 \times 20.0 = 240$; $r = \frac{0.03}{12} = 0.00250$;

$C = $ monthly payment on mortgage:

$$C = (0.00250 \times 350,000) \left(\frac{(1 + 0.00250)^{240}}{(1 + 0.00250)^{240} - 1} \right)$$

$$C = (875.00000) \left(\frac{1.82075}{1.82075 - 1} \right)$$

$$C = 1,941.09$$

12. $n = 12 \times 20.0 = 240$; $r = \frac{0.05}{12} = 0.00417$;

$C = $ monthly payment on mortgage:

$$C = (0.00417 \times 350,000) \left(\frac{(1 + 0.00417)^{240}}{(1 + 0.00417)^{240} - 1} \right)$$

$$C = (1,458.33333) \left(\frac{2.71264}{2.71264 - 1} \right)$$

$$C = 2,309.85$$

13. $n = 12 \times 20.0 = 240$; $r = \frac{0.06}{12} = 0.00500$;

$C =$ monthly payment on mortgage:

$$C = (0.00500 \times 350,000) \left(\frac{(1 + 0.00500)^{240}}{(1 + 0.00500)^{240} - 1} \right)$$

$$C = (1,750.00000) \left(\frac{3.31020}{3.31020 - 1} \right)$$

$$C = 2,507.51$$

14. $n = 12 \times 20.0 = 240$; $r = \frac{0.08}{12} = 0.00667$;

$C =$ monthly payment on mortgage:

$$C = (0.00667 \times 350,000) \left(\frac{(1 + 0.00667)^{240}}{(1 + 0.00667)^{240} - 1} \right)$$

$$C = (2,333.33333) \left(\frac{4.92680}{4.92680 - 1} \right)$$

$$C = 2,927.54$$

15. $n = 12 \times 20.0 = 240$; $r = \frac{0.09}{12} = 0.00750$;

$C =$ monthly payment on mortgage:

$$C = (0.00750 \times 350,000) \left(\frac{(1 + 0.00750)^{240}}{(1 + 0.00750)^{240} - 1} \right)$$

$$C = (2,625.00000) \left(\frac{6.00915}{6.00915 - 1} \right)$$

$$C = 3,149.04$$

16. $n = 12 \times 25.0 = 300$; $r = \frac{0.03}{12} = 0.00250$;

$C =$ monthly payment on mortgage:

$$C = (0.00250 \times 350,000)\left(\frac{(1 + 0.00250)^{300}}{(1 + 0.00250)^{300} - 1}\right)$$

$$C = (875.00000)\left(\frac{2.11502}{2.11502 - 1}\right)$$

$$C = 1,659.74$$

17. $n = 12 \times 25.0 = 300$; $r = \frac{0.05}{12} = 0.00417$;

$C =$ monthly payment on mortgage:

$$C = (0.00417 \times 350,000)\left(\frac{(1 + 0.00417)^{300}}{(1 + 0.00417)^{300} - 1}\right)$$

$$C = (1,458.33333)\left(\frac{3.48129}{3.48129 - 1}\right)$$

$$C = 2,046.07$$

18. $n = 12 \times 25.0 = 300$; $r = \frac{0.06}{12} = 0.00500$;

$C =$ monthly payment on mortgage:

$$C = (0.00500 \times 350,000)\left(\frac{(1 + 0.00500)^{300}}{(1 + 0.00500)^{300} - 1}\right)$$

$$C = (1,750.00000)\left(\frac{4.46497}{4.46497 - 1}\right)$$

$$C = 2,255.05$$

19. $n = 12 \times 25.0 = 300$; $r = \frac{0.08}{12} = 0.00667$;

$C =$ monthly payment on mortgage:

$$C = (0.00667 \times 350{,}000) \left(\frac{(1 + 0.00667)^{300}}{(1 + 0.00667)^{300} - 1} \right)$$

$$C = (2{,}333.33333) \left(\frac{7.34018}{7.34018 - 1} \right)$$

$$C = 2{,}701.36$$

20. $n = 12 \times 25.0 = 300$; $r = \frac{0.09}{12} = 0.00750$;

$C =$ monthly payment on mortgage:

$$C = (0.00750 \times 350{,}000) \left(\frac{(1 + 0.00750)^{300}}{(1 + 0.00750)^{300} - 1} \right)$$

$$C = (2{,}625.00000) \left(\frac{9.40841}{9.40841 - 1} \right)$$

$$C = 2{,}937.19$$

21. $n = 12 \times 30.0 = 360$; $r = \frac{0.03}{12} = 0.00250$;

$C =$ monthly payment on mortgage:

$$C = (0.00250 \times 350{,}000) \left(\frac{(1 + 0.00250)^{360}}{(1 + 0.00250)^{360} - 1} \right)$$

$$C = (875.00000) \left(\frac{2.45684}{2.45684 - 1} \right)$$

$$C = 1{,}475.61$$

22. $n = 12 \times 30.0 = 360$; $r = \frac{0.05}{12} = 0.00417$;

$C =$ monthly payment on mortgage:

$$C = (0.00417 \times 350,000) \left(\frac{(1 + 0.00417)^{360}}{(1 + 0.00417)^{360} - 1} \right)$$

$$C = (1,458.33333) \left(\frac{4.46774}{4.46774 - 1} \right)$$

$$C = 1,878.88$$

23. $n = 12 \times 30.0 = 360$; $r = \frac{0.06}{12} = 0.00500$;

$C =$ monthly payment on mortgage:

$$C = (0.00500 \times 350,000) \left(\frac{(1 + 0.00500)^{360}}{(1 + 0.00500)^{360} - 1} \right)$$

$$C = (1,750.00000) \left(\frac{6.02258}{6.02258 - 1} \right)$$

$$C = 2,098.43$$

24. $n = 12 \times 30.0 = 360$; $r = \frac{0.08}{12} = 0.00667$;

$C =$ monthly payment on mortgage:

$$C = (0.00667 \times 350,000) \left(\frac{(1 + 0.00667)^{360}}{(1 + 0.00667)^{360} - 1} \right)$$

$$C = (2,333.33333) \left(\frac{10.93573}{10.93573 - 1} \right)$$

$$C = 2,568.18$$

25. $n = 12 \times 30.0 = 360$; $r = \frac{0.09}{12} = 0.00750$;

$C =$ monthly payment on mortgage:

$$C = (0.00750 \times 350,000) \left(\frac{(1 + 0.00750)^{360}}{(1 + 0.00750)^{360} - 1} \right)$$

$$C = (2,625.00000) \left(\frac{14.73058}{14.73058 - 1} \right)$$

$$C = 2,816.18$$