Newton Chinese Language School

Math 9 Spring 2019 Final Exam 6/16/2019 Name: _____

(5 points each, unless otherwise noted)

1. If r and s are roots of $3x^2 - 16x + 12 = 0$, find $\log_2 r + \log_2 s$.

2. If $c = \log_y b$, $c \neq 0$, and $d = 2\log_{y^3} b^3$, then find $\frac{d}{c}$.

3. Evaluate the following:

   $(a)\ \log_3 27^{2007} =$ _____ (b) $\log_2 \frac{2}{3} + \log_2 6$ = _____

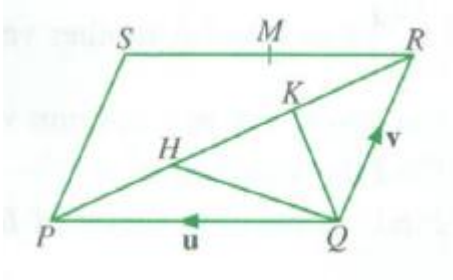
   (c) $\log_{2\sqrt{2}} 16 =$ _____ (d) $(\log_2 5)(\log_5 12) + (\log_2 7)(\log_7 \frac{8}{3})$ = _____

4. Find all t such that $2\log_3(1 - 5t) = \log_3(2t + 5) + 2$

5. Solve the equation $4^{x-3} - 8^{x+5} = 0$

6. Solve the equation $9^{2x+1} * 27^{-x} = \left(\frac{1}{3}\right)^5$

7. PQRS is a parallelogram. H and K trisect the diagonal PR. M is the midpoint of RS. $\overrightarrow{QP} = u, \overrightarrow{QR} = v$. (3 pts each)



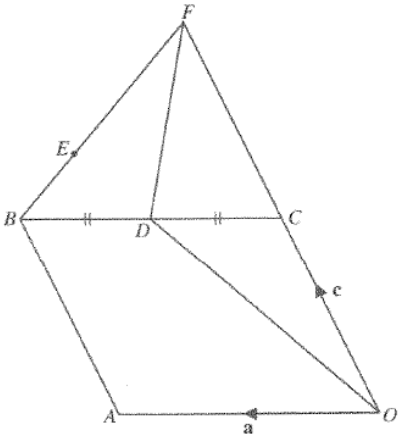
a. Express the following in terms of *u* and *v*:

$\overrightarrow{PR}$ _____ $\overrightarrow{QH}$ _____

$\overrightarrow{QK}$ _____ $\overrightarrow{QM}$ _____

b. What is the relationship between $\overrightarrow{QK}$ and $\overrightarrow{QM}$? _____

8. In the diagram, OABC is a parallelogram and D is the midpoint of BC. BE and OC produced intersect at the point F. BE : BF = 1 : 3 and OC : OF = 1 : 2. Let $\overrightarrow{OA} = \boldsymbol{a}$ *and* $\overrightarrow{OC} = \boldsymbol{c}$.
Express in terms of **a** and **c**: (3 pts each)



$\overrightarrow{AC} =$ _____ $\overrightarrow{BF} =$ _____

$\overrightarrow{OD} =$ _____ $\overrightarrow{OE} =$ _____

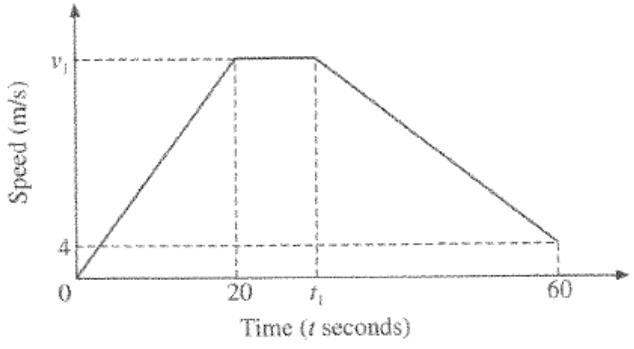
9. A loan grows to $8400 after 1 year and $9261 after 3 years with compound interest that is compounded annually. The interest rate per year is r% and remains unchanged in these years. Find:

(a) The value of r _____ (5 pts)

(b) The original loan _____ (5 pts)

(c) The total interest in the first 2 years _____ (4 pts)

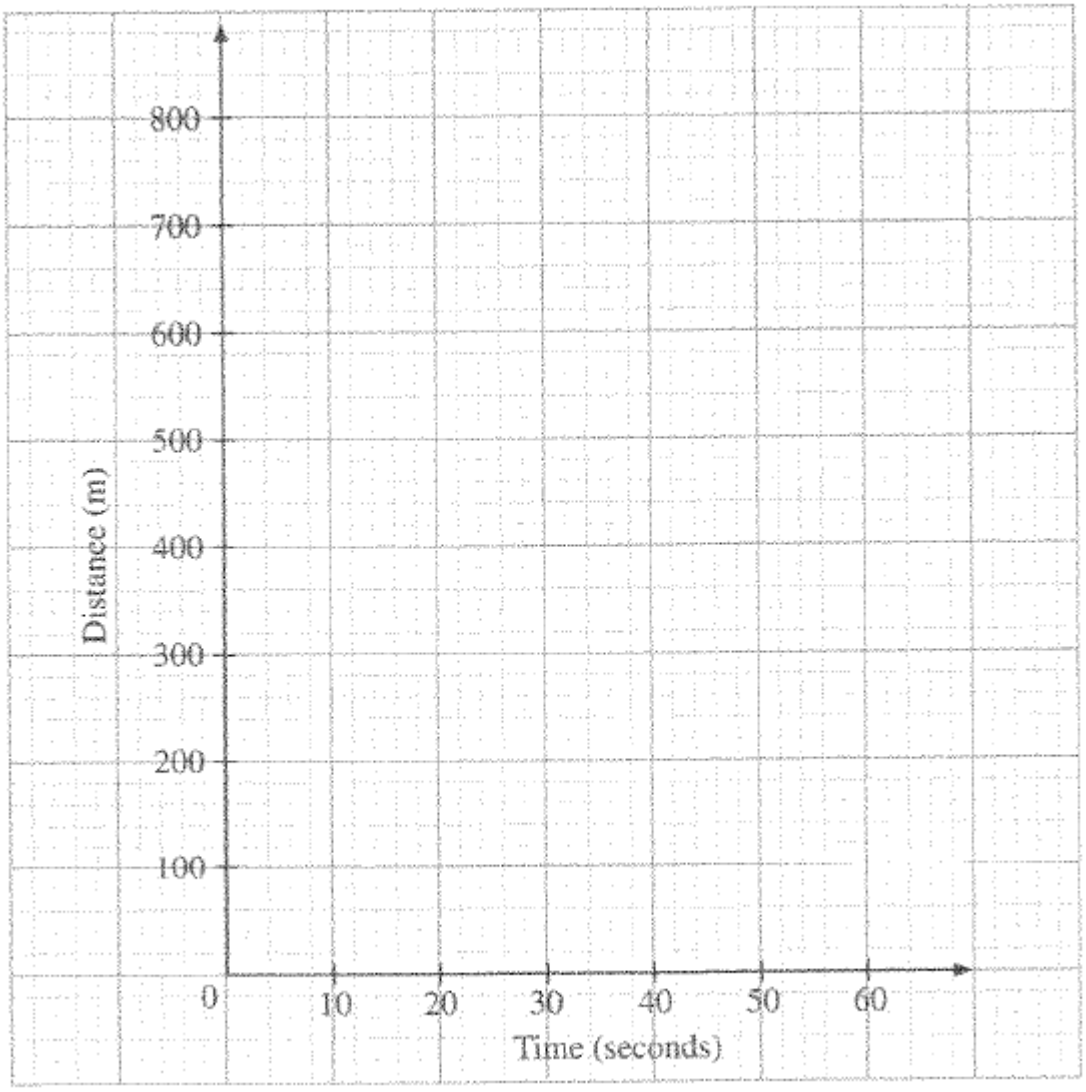
10. The diagram shows the speed-time graph of a car during a 60-second interval of a journey.



a. Find the value of v1 if the average speed of the car in the first 20 seconds is 10 m/s _____ (4 pts)

b. Find the value of t1 if the acceleration of the car from t = t1 to t = 60 is $-\frac{8}{15}\ m/s^2$ _____ (4 pts)

c. Sketch the distance-time graph of the car during the 60-second period on the diagram below. (6 pts)


800
700
600
500
400
300
200
100
0
Distance (m)
10
20
30
40
50
60
Time (seconds)