



Warm up questions

Question 1. 2015 Paper 1 Q3

Let $f(x) = -x^2 + 12x - 27$, $x \in \mathbb{R}$.

(a) (i) Complete Table 1 below.

Table 1							
x	3	4	5	6	7	8	9
$f(x)$	0	5			8		

Question 2. Solve for x :

$$\frac{x+7}{3} + \frac{2}{x} = 4$$

Question 3. Express $\sqrt{48} - \sqrt{12} + \sqrt{27}$ in the form $a\sqrt{b}$

Question 4. Simplify:

$$(b+1)^3 - (b-1)^3$$

-b Formula

Question 5. Solve for x : $10x^2 + 6x - 52 = 0$

Question 6. 2011 Paper 1 Q1

Solve the equation $x^2 - 2\sqrt{3}x - 9 = 0$, giving your answers in the form $a\sqrt{3}$, where $a \in \mathbb{Q}$.

Question 7. 2015 Paper 1 Q2 (25 marks)

Solve the equation $x^3 - 3x^2 - 9x + 11 = 0$.

Write any irrational solution in the form $a + b\sqrt{c}$, where $a, b, c \in \mathbb{Z}$.

Inequalities

Question 8. 2013 Paper 1 Q2

(a) Find the set of all real values of x for which $2x^2 + x - 15 \geq 0$.

Question 9. Solve the following inequality and graph the solution, $x \in \mathbb{R}$:

$$|3x+4| \leq |x+2|$$

Question 10. 2018 Paper 1 Q1 (10 marks)



Solve the inequality $\frac{2x-3}{x+2} \geq 3$, where $x \in \mathbb{R}$ and $x \neq -2$.

Question 11. 2012 Paper 1 Q1

Find the set of all real values of x for which $\frac{2x-5}{x-3} \leq \frac{5}{2}$.

Simultaneous Equations

Question 12. 2012 Paper 1 Q1

Solve the simultaneous equations:

$$\begin{aligned} a^2 - ab + b^2 &= 3 \\ a + 2b + 1 &= 0 \end{aligned}$$

Question 13. 2018 Paper 1 Q1 (15 marks)

Solve the simultaneous equations.

$$\begin{aligned} 2x + 3y - z &= -4 \\ 3x + 2y + 2z &= 14 \\ x - 3z &= -13 \end{aligned}$$

Logs

Question 14. Solve $\log_x 8 = 3$

Question 15. Solve $32^{x-1} = 28$ for x and give your answer to 2 decimal places

Question 16. 2016 P1 Q4 (10 marks):

Given $\log_a 2 = p$ and $\log_a 3 = q$, where $a > 0$, write each of the following in terms of p and q :

(i) $\log_a \frac{8}{3}$

(ii) $\log_a \frac{9a^2}{16}$.

Question 17. 2014 P1 Q2

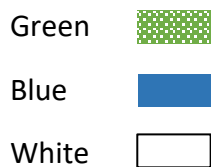
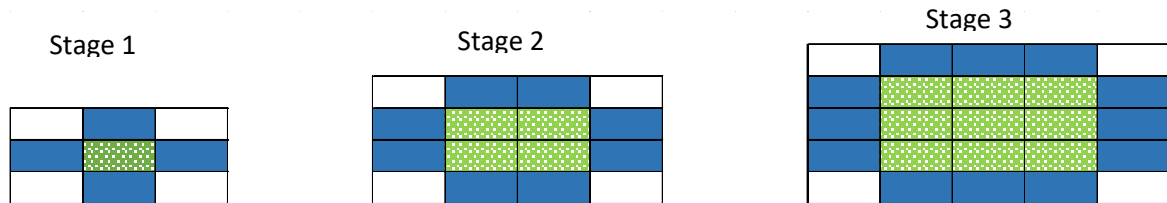
Given that $p = \log_c x$, express $\log_c \sqrt{x} + \log_c(cx)$ in terms of p .

Solutions: <https://web.actuaries.ie/students/maths-tutorials-higher-level-leaving-certificate-20192020> or google 'actuaries maths tutorials'



Additional Questions

Question 18. Mary is interested in having the following tile pattern for her kitchen floor.



- 1) Write an expression for the total number of tiles in the x^{th} stage of the pattern.
- 2) If there are 324 tiles in total in a pattern, how many green tiles are there?
- 3) Mary's kitchen area measures 6.76 m^2 . The side of each square tile is 20 cm long. Find the number of each colour of tile that needs to be ordered.

Question 19. 2016 Q8 part b, 25 marks

The heptathlon is an Olympic competition. It consists of seven events including the 200 m race and the javelin. The scoring system uses formulas to calculate a score for each event. The table below shows the formulas for two of the events and the values of constants used in these formulas, where x is the time taken (in seconds) or distance achieved (in metres) by the competitor and y is the number of points scored in the event.

Event	x	Formula	a	b	c
200 m race	Time (s)	$y = a(b - x)^c$	4.99087	42.5	1.81
Javelin	Distance (m)	$y = a(x - b)^c$	15.9803	3.8	1.04

- 1) In the heptathlon, Jessica ran 200 m in 23.8 s and threw the javelin 58.2 m. Use the formulas in the table to find the number of points she scored in each of these events, correct to the nearest point.
- 2) The world record distance for the javelin, in the heptathlon, would merit a score of 1295 points. Find the world record distance for the javelin, in the heptathlon, correct to two decimal places.
- 3) The formula used to calculate the points for the 800 m race, in the heptathlon, is the same formula used for the 200 m race but with different constants. Jessica ran the 800 m race in 2 minutes and 1.84 seconds which merited 1087 points. If $a = 0.11193$ and $b = 254$ for the 800 m race, find the value of c for this event, correct to two decimal places.

