

Year 13 Maths Revision Timetable 2019

Below is a suggested schedule of activities in order to structure your revision of A-level content for your upcoming mocks. This plan is quite extensive, but does not cover all the material that will appear in the tests. Therefore, you should carefully look through your textbooks to check you understand everything covered so far.

Doing practice questions once you have learnt the material is the most effective method for revising. In your daily hour of revision for each topic, we have suggested questions to practice and given you one or two unseen exam questions to try. If you need any help, use solution bank, ask one another, or look online at websites such as www.physicsandmathstutor.com, www.drfrostmaths.com, www.examsolutions.net or www.youtube.com.

Day	Revision Tasks
1	<p>Focus: Statistics</p> <p>Warm up – write down everything you can remember about regression, correlation, hypothesis testing, conditional probability and the normal distribution.</p> <p>Make notes on the above topics, filling in the gaps from your memory.</p> <p>Do questions from Review Exercise 1 in Stats and Mechanics Year 2 book. Then try exam question 1.</p>
2	<p>Focus: Mechanics (not ch7 or ch8)</p> <p>Warm up – write down everything you can remember about moments, forces & friction and projectiles.</p> <p>Make notes on the above topics, filling in the gaps from your memory.</p> <p>Do questions from the mixed exercises from chapters 4, 5 and 6. Then try exam questions 2 and 3.</p>
3	<p>Focus: Pure: Differentiation Techniques and Rules</p> <p>Warm up – write down everything you can remember about the rules and methods for differentiation.</p> <p>Make notes on the above topics, filling in the gaps from your memory.</p> <p>Do questions from the mixed exercise from chapter 9, then try exam question 4.</p>
4	<p>Focus: Pure: Trigonometry</p> <p>Warm up – write down everything you remember about radians, graphs, inverse trig functions, trigonometric identities and solving trigonometric equations.</p> <p>Make notes on the above topics, filling in the gaps from your memory.</p> <p>Do questions from the mixed exercises from chapters 5, 6 and 7, then try exam question 5.</p>
5	<p>Focus: Sequences and the Binomial Expansion</p> <p>Warm up – write down everything you can remember about arithmetic & geometric sequences and series (including summing to infinity) and the binomial expansion.</p> <p>Make notes on the above topics, filling in the gaps from your memory.</p> <p>Do questions from the mixed exercises from chapters 3 and 4, then try exam questions 6 and 7.</p>

Statistics

1. A farmer noticed that some of the eggs laid by his hens had double yolks. He estimated the probability of this happening to be 0.05. Eggs are packed in boxes of 12. Find the probability that in a box, the number of eggs with double yolks will be

(a) exactly one, (3)

(b) more than three. (2)

A customer bought three boxes.

(c) Find the probability that only 2 of the boxes contained exactly 1 egg with a double yolk. (3)

The farmer delivered 10 boxes to a local shop.

(d) Using a suitable approximation, find the probability that the delivery contained at least 9 eggs with double yolks. (4)

The weight of an individual egg can be modelled by a normal distribution with mean 65 g and standard deviation 2.4 g.

(e) Find the probability that a randomly chosen egg weighs more than 68 g. (3)

Mechanics

2.

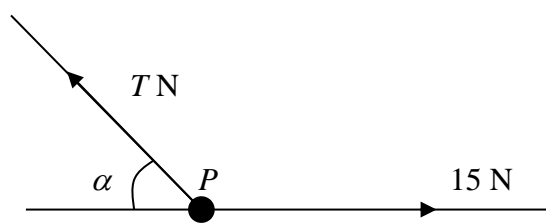


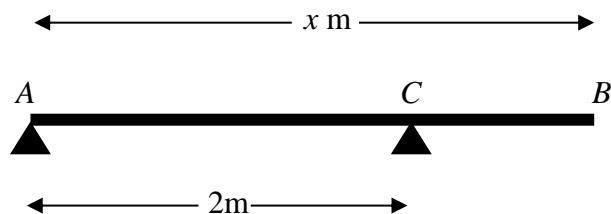
Fig. 2

A particle P of mass 2 kg is held in equilibrium under gravity by two light inextensible strings. One string is horizontal and the other is inclined at an angle α to the horizontal, as shown in Fig. 2. The tension in the horizontal string is 15 N. The tension in the other string is T newtons.

(a) Find the size of the angle α . (6)

(b) Find the value of T . (2)

3.



A uniform plank AB has weight 80 N and length x metres. The plank rests in equilibrium horizontally on two smooth supports at A and C , where $AC = 2$ m, as shown. A rock of weight 20 N is placed at B and the plank remains in equilibrium. The reaction on the plank at C has magnitude 90 N. The plank is modelled as a rod and the rock as a particle.

(a) Find the value of x . (4)

(b) State how you have used the model of the rock as a particle. (1)

(c) The support at A is now moved to a point D on the plank and the plank remains in equilibrium with the rock at B . The reaction on the plank at C is now three times the reaction at D . Find the distance AD . (4)

Differentiation

4. (i) Differentiate with respect to x

(a) $x^2 \cos 3x$, (3)

(b) $\frac{\ln(x^2 + 1)}{x^2 + 1}$. (4)

(ii) A curve C has the equation

$$y = \sqrt{4x+1}, \quad x > -\frac{1}{4}, \quad y > 0.$$

The point P on the curve has x -coordinate 2 . Find an equation of the tangent to C at P in the form $ax + by + c = 0$, where a , b and c are integers.

(6)

Trigonometry

5. (a) Using the identity $\cos(A + B) \equiv \cos A \cos B - \sin A \sin B$, prove that

$$\cos 2A \equiv 1 - 2 \sin^2 A. \quad (2)$$

- (b) Show that

$$2 \sin 2\theta - 3 \cos 2\theta - 3 \sin \theta + 3 \equiv \sin \theta(4 \cos \theta + 6 \sin \theta - 3). \quad (4)$$

- (c) Express $4 \cos \theta + 6 \sin \theta$ in the form $R \sin(\theta + \alpha)$, where $R > 0$ and $0 < \alpha < \frac{1}{2}\pi$. (4)

- (d) Hence, for $0 \leq \theta < \pi$, solve $2 \sin 2\theta = 3(\cos 2\theta + \sin \theta - 1)$,
giving your answers in radians to 3 significant figures, where appropriate. (5)
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Sequences and Series

6. A trading company made a profit of £50 000 in 2016 (Year 1). A model for future trading predicts that profits will increase year by year in a geometric sequence with common ratio r , $r > 1$. The model therefore predicts that in 2017 (Year 2) a profit of £50 000 r will be made.

- (a) Write down an expression for the predicted profit in Year n . (1)

The model predicts that in Year n , the profit made will exceed £200 000.

- (b) Show that $n > \frac{\log 4}{\log r} + 1$. (3)

- (c) Using the model with $r = 1.09$, find the year when the profit made will first exceed £200 000, (2)

- (d) and find the total of the profits that will be made by the company over the 10 years from 2016 to 2025 inclusive, giving your answer to the nearest £10 000. (3)
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7. (a) Use the binomial theorem to expand $(8 - 3x)^{\frac{1}{3}}$, $|x| < \frac{8}{3}$,
in ascending powers of x , up to and including the term in x^3 , giving each term as a simplified fraction. (5)

- (b) Use your expansion, with a suitable value of x , to obtain an approximation to the cube root of 7.7 giving your answer to 7 decimal places. (2)

