

New Century Physics for Queensland (3rd ed, 2019) – Oxford University Press.

Practice exam answers for Unit 3

Page 242-243 of the Student Book

Explanations for the answers to the multiple choice questions.

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Q	Ans	Explanations
1	C	Minimum range would be when it is launched vertically (90°), and maximum range when launched at 45° . You could argue that if it was fired at 0° it wouldn't go anywhere as it would be at ground level. But it could skid or roll along the surface. Besides, there is no option that has 45° as the second part. You might also ask if you have to learn that 45° gives maximum range. Well, no, but it was generally the outcome of the mandatory prac "Angled projection and distance", so I'd advise you to learn that. See the prac on page 404 of my NCPQ U3&4 text.
2	C	The net force F_{net} acting along the incline is due only to the parallel component of the truck's weight ($F_p = mg \sin\theta$). This net force is equal to $m \times a$. $F_{net} = mg \sin\theta$ $ma = mg \sin\theta$ $a = g \sin\theta = 9.8 \times \sin 15^\circ$ $= 2.536 \text{ m s}^{-2}$ $v^2 = u^2 + 2as$ $0 = 16.7^2 + 2 \times 2.536 \times s$ $s = \frac{278.89}{5.072} = 55 \text{ m}$
3	B	$F_{Q_1Q_2} = \frac{kQ_1Q_2}{r^2}$ $F_{Q_1q} = \frac{kQ_1q}{(2r)^2} = \frac{kQ_1 \times \frac{3}{4}Q_2}{4r^2} = \frac{3}{4} \times \frac{kQ_1Q_2}{r^2}$ $= \frac{3}{16} \times \frac{kQ_1Q_2}{r^2}$ $= \frac{3F}{16}$
4	D	Using Ampere's right hand rule for loops and solenoids, fingers curl anticlockwise and thumb points out of the page.
5	A	$emf = \frac{\Delta\phi}{\Delta t} = N \frac{(3-1) \times 10^{-4}}{(5-0) \times 10^{-3}} = 1000 \times \frac{2}{5} \times 10^{-1} = 40 \text{ V}.$ <p>If you got 0.04 V, you missed the fact that it was 1000 turns. I missed this first time around. Note also that the x-axis is in milliseconds.</p>

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