Caroline Chisholm School

Ambition Confidence Success

Everyone Every Lesson Every Opportunity

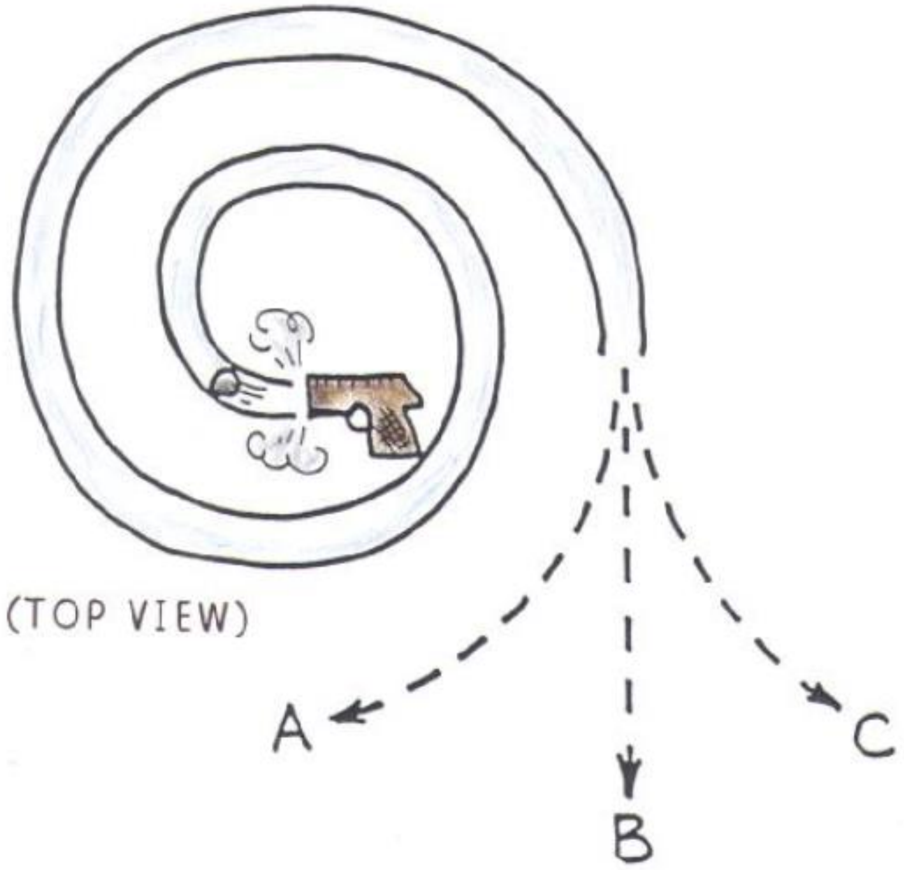
AQA A Level Physics

Induction July 2023

Physics Quiz! - 10 Questions...

Q1

NEXT-TIME QUESTION



When the pellet fired into the spiral tube emerges, which path will it follow? (Neglect gravity.)

Q2

NEXT-TIME QUESTION

Arnold Strongman and Suzie Small pull on opposite ends of a rope in a tug of war. The greater force exerted on the rope is by

a) Arnold.
b) Suzie.
c)… Both the same.

Hewitt Drew it!

CONCEPTUAL Physics

Q3

NEXT-TIME QUESTION

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Suppose a cannon is propped against a massive tree to reduce recoil when it fires. Then the range of the cannonball will be

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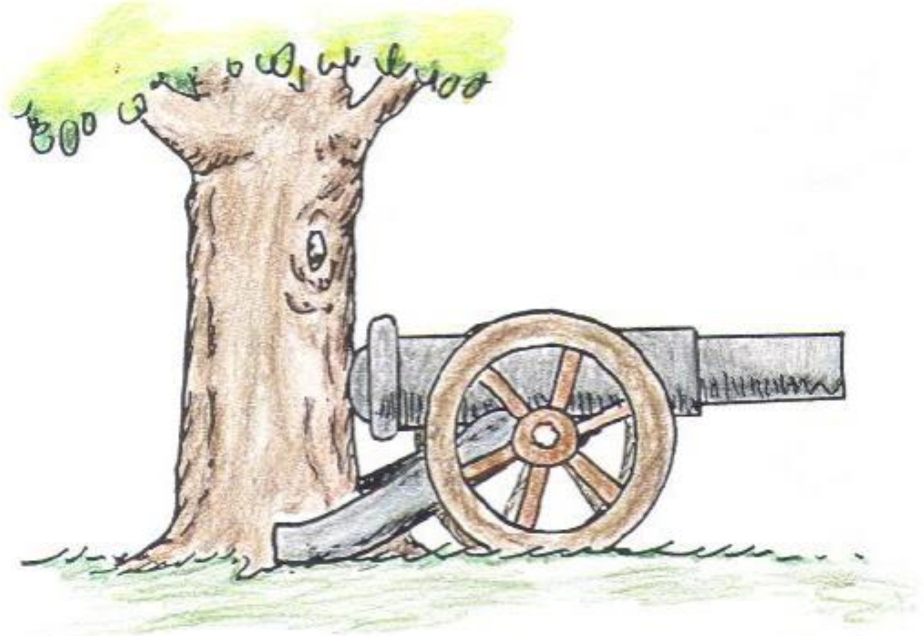

thanx to David Vasquez

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Q4

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Light rays bend as they pass from air into water at a non-90 degree angle. This is refraction. Which quantity doesn't change when light refracts?

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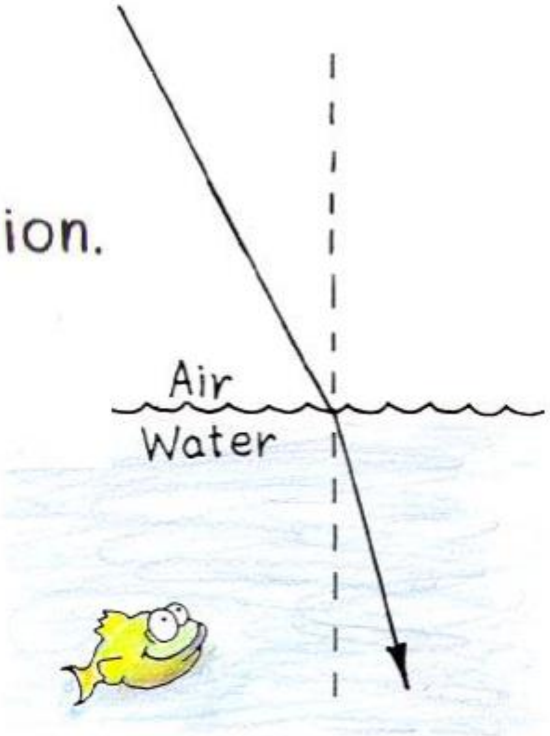

ARBOR SCIENTIFIC TOOLS THAT TEACH.

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Q5

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When at rest on the launching pad, the force of gravity on the space shuttle is quite huge—the weight of the shuttle. When in orbit, some 200 km above Earth's surface, the force of gravity on the shuttle is

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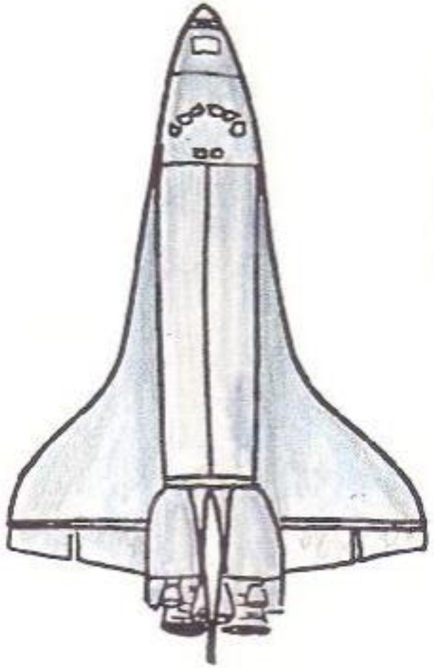

(Neglect changes in the weight of the fuel carried by the shuttle.)

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Q6

NEXT-TIME QUESTION

CONCEPTUAL Physics

A birthday candle burns in a deep drinking glass. When the glass is whirled around in a circular path, say held at arm's length while one is spinning like an ice skater, which way does the candle flame point?

Hewitt Drew It!

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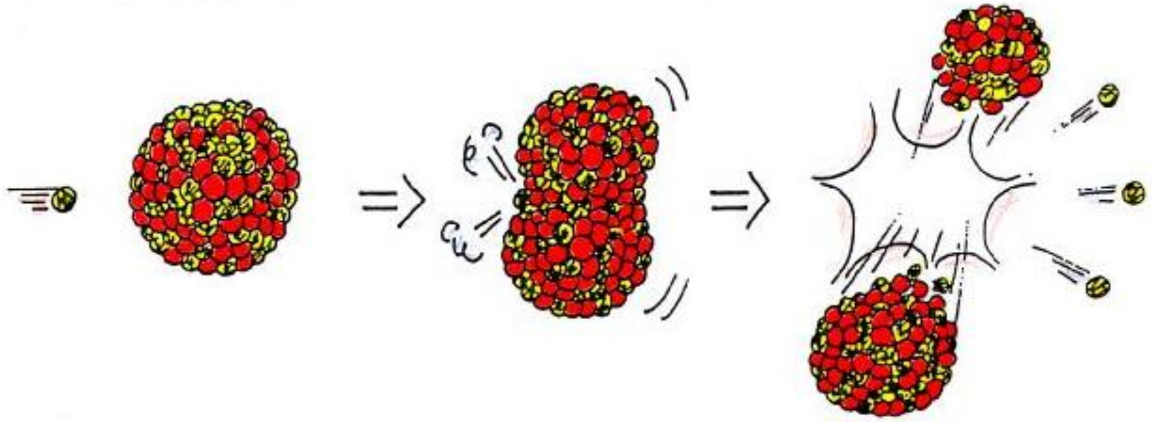
When a U-235 nucleus absorbs a neutron and undergoes nuclear fission, about 200 MeV of energy is released. But in what form? Interestingly, most of this energy initially appears in the form of



a) gamma rays.

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e) each of these, about equally.

CONCEPTUAL Physics

Hewitt Drew it!

Q8

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CONCEPTUAL Physics

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Q9

NEXT-TIME QUESTION

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a) a higher pitch.

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Hewitt Drew it!

Q10

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When the series circuit shown to the right is connected, Bulb A is brighter than Bulb B. If the positions of the bulbs were reversed,

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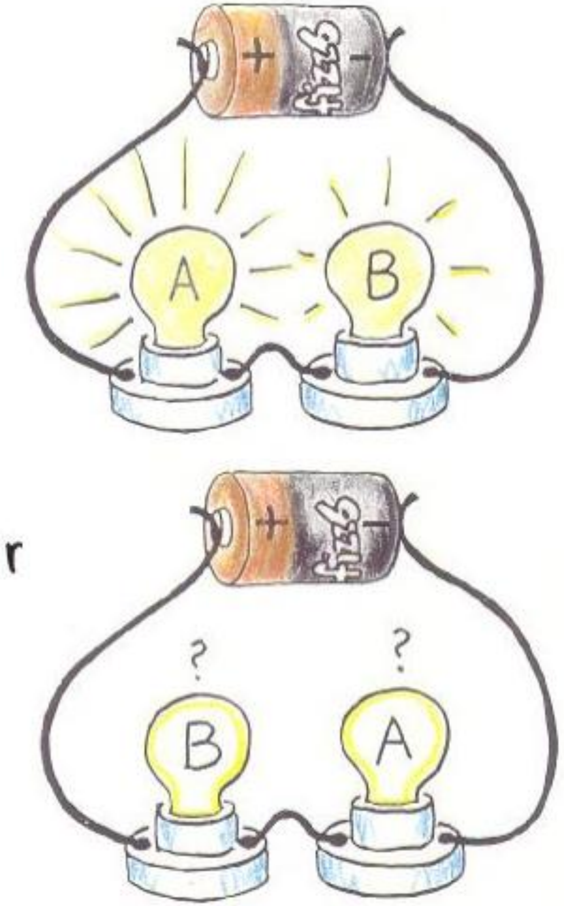

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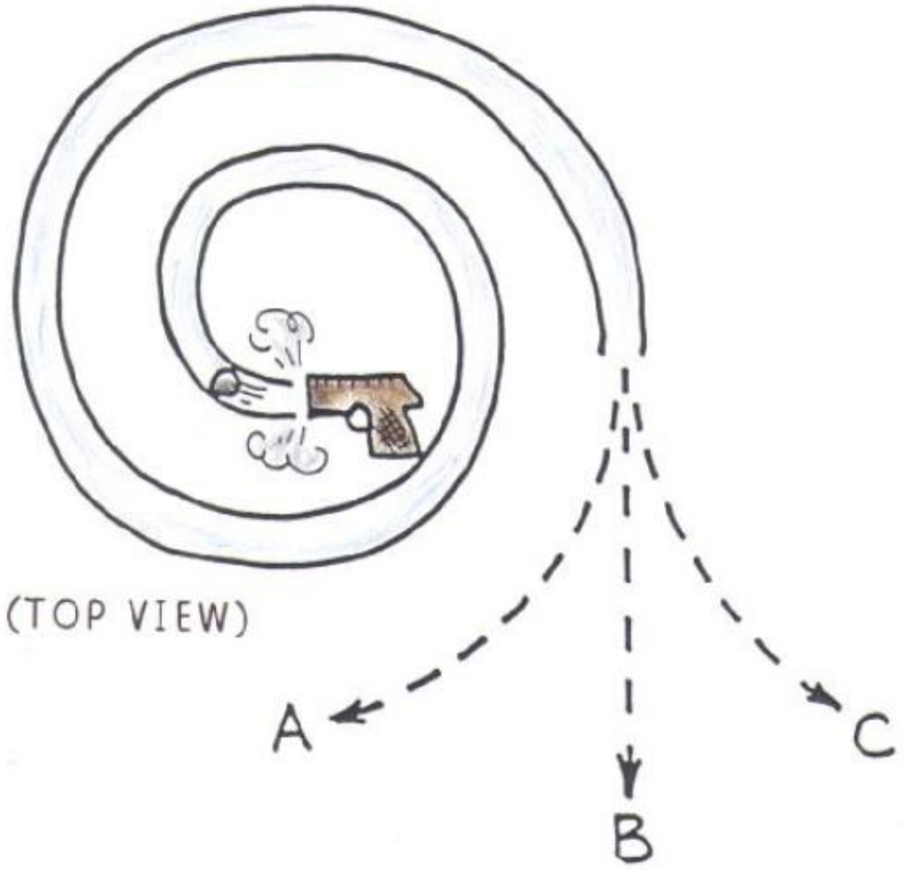
Hewitt Drew it!

Q1

Next-Time Question



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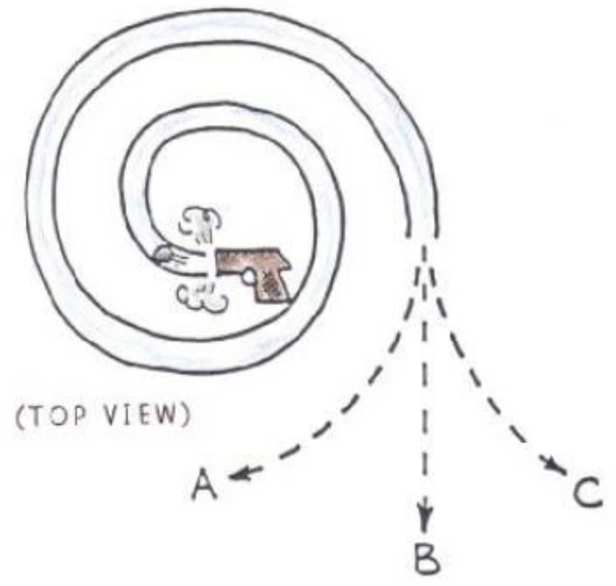
A1



When the pellet fired into the spiral tube emerges, which path will it follow? (Neglect gravity.)

Answer: B

While in the tube the pellet is forced to curve, but when it gets outside, no force is exerted on the pellet and (law of inertia) it follows a straight-line path...B!

Q2

Next-Time Question

Arnold Strongman and Suzie Small pull on opposite ends of a rope in a tug of war. The greater force exerted on the rope is by

a) Arnold.
b) Suzie.
c)... Both the same.

CONCEPTUAL Physics

ARBOR SCIENTIFIC

A2

Next-Time Question

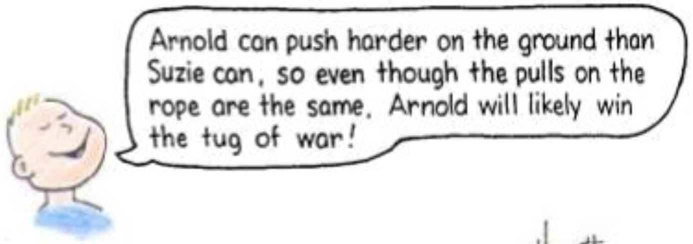
CONCEPTUAL Physics

Arnold Strongman and Suzie Small pull on opposite ends of a rope in a tug of war. The greater force exerted on the rope is by

a) Arnold.
b) Suzie.
c)... Both the same.

Answer: c

Arnold can pull no harder on the rope than Suzie. Rope tension is the same all along the rope, including the ends. Just as a wheel on ice can exert no more force on the ice than the ice exerts on the wheel, and just as one cannot punch an empty paper bag with any more force than the bag can exert on the puncher, Arnold can exert no more force on his end of the rope than Suzie exerts on her end.



ARBOR SCIENTIFIC
TOOLS THAT TEACH.

Hewitt Drew-it!

Q3

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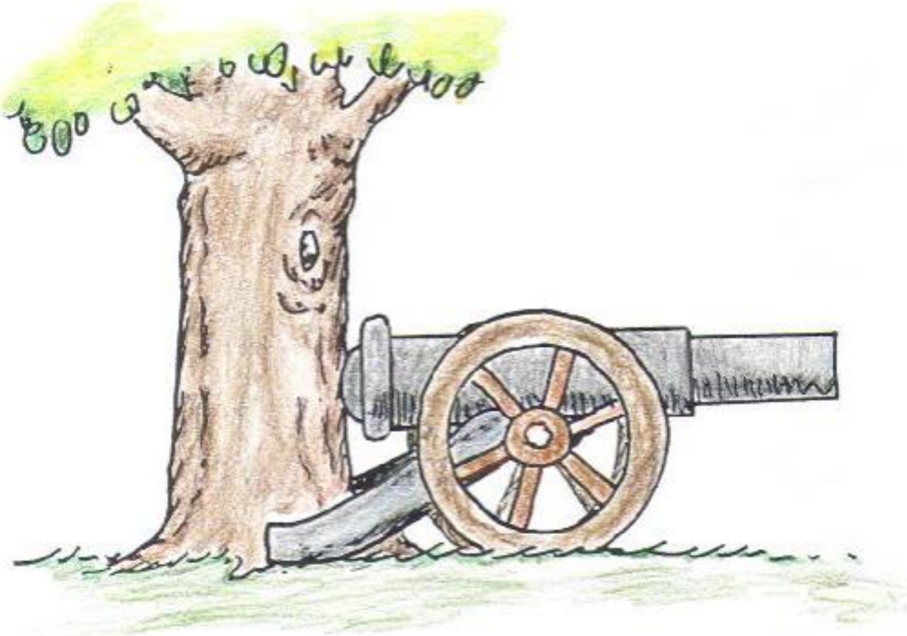

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ARBOR SCIENTIFIC
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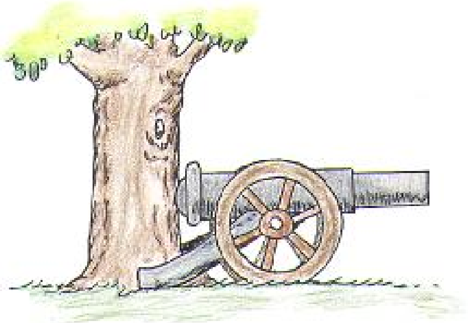
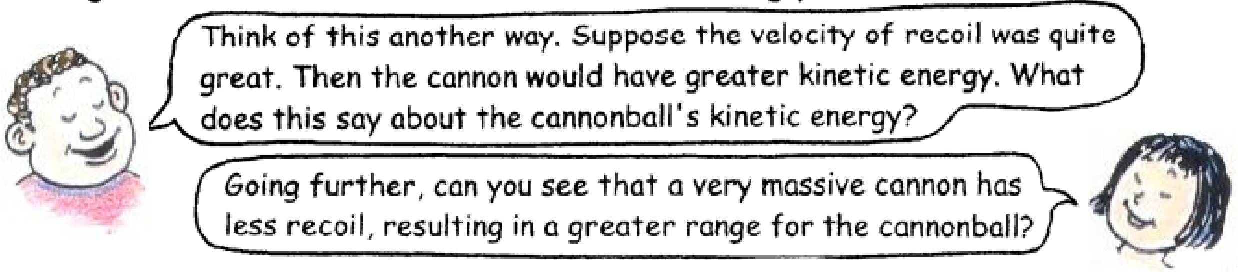


Answer: a

Its range is increased. To understand why, think *energy conservation*. Most of the potential energy of the gunpowder is converted into kinetic energy when the gunpowder fires. That's both kinetic energy of the *cannonball* and kinetic energy of the *recoiling cannon*. Because the tree reduces recoil, the cannonball gets a greater share of kinetic energy—hence its increased range.



Arbor Scientific
Tools That Teach.

Hewitt Drew it!

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Light rays bend as they pass from air into water at a non-90 degree angle. This is refraction. Which quantity doesn't change when light refracts?

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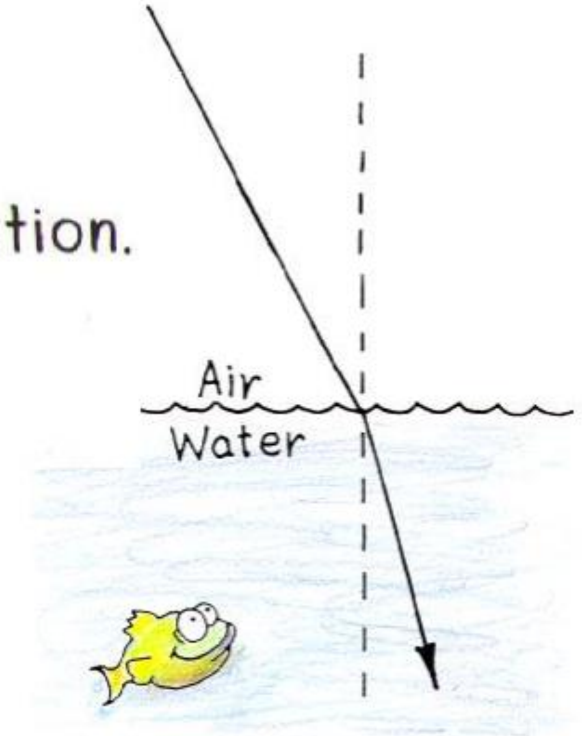

CONCEPTUAL Physics

ARBOR SCIENTIFIC

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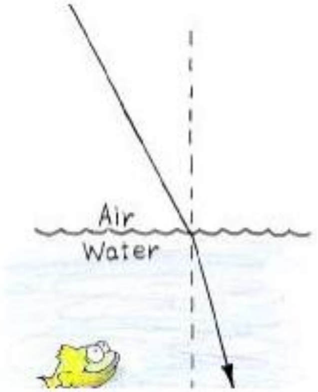
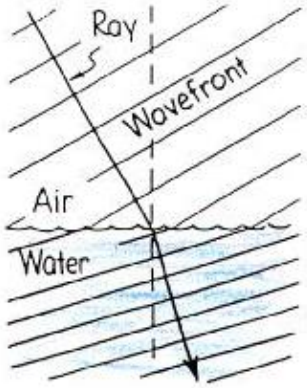


Answer: c. frequency of light

The average speed of light in water is less than in air. Index of refraction is a quantity that changes when wave speed changes (higher index for lower speed). So we see the index of refraction is greater for water than for air.

The wave just outside the surface "drives" the wave just inside the surface, so their rates of vibration match. Hence, what doesn't change is frequency. Same frequency and reduced speed means a shorter wavelength in water—as seen by the "compressed" wavefronts in the sketch.



The key to refraction is *changes in wave speed*.

Hewitt Drew it!

ARBOR SCIENTIFIC

Q5

NEXT-TIME QUESTION

CONCEPTUAL Physics

When at rest on the launching pad, the force of gravity on the space shuttle is quite huge—the weight of the shuttle. When in orbit, some 200 km above Earth's surface, the force of gravity on the shuttle is

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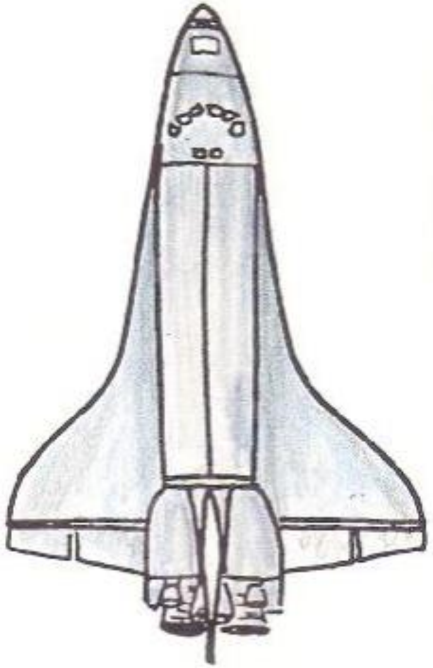

(Neglect changes in the weight of the fuel carried by the shuttle.)

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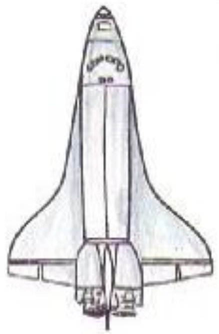
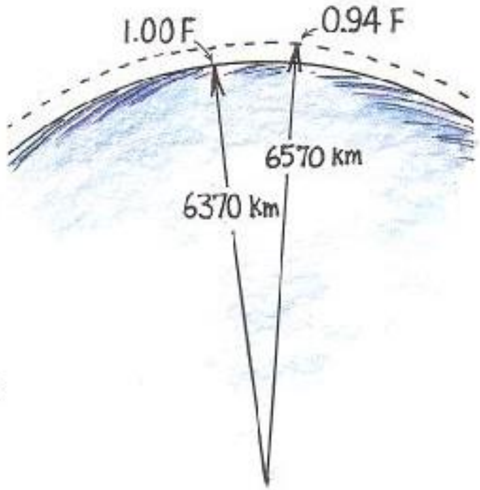


CONCEPTUAL Physics

Answer: a, nearly as much

The gravitational force on the shuttle, whether at rest or in orbit, depends on only 3 things: its mass, the mass of Earth, and its distance from Earth's center. The only variable is distance. On the launching pad the shuttle is about 6370 km from Earth's center. When in orbit it is about 6370 + 200 km from Earth's center. In accord with $F = GmM/R^2$, the 200-km difference in distance means a 0.06 fractional difference in force. Discounting the changes in the fuel, the gravitational force on the shuttle in orbit is 94% as much as when on Earth's surface—nearly the same.



This force isn't sensed by astronauts because they're in continual free fall. But it's there!

If it weren't, the craft would fly away from Earth in a straight-line path.

ARBOR SCIENTIFIC

TOOLS THAT TEACH

Q6

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CONCEPTUAL Physics

A birthday candle burns in a deep drinking glass. When the glass is whirled around in a circular path, say held at arm's length while one is spinning like an ice skater, which way does the candle flame point?

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A6

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A birthday candle burns in a deep drinking glass. When the glass is whirled around in a circular path, say held at arm's length while one is spinning like an ice skater, which way does the candle flame point?

Answer: inward

The candle flame points inward, toward the center of the circular motion. This is because the air in the glass is more dense than the flame and "sloshes" to the farther part of the glass. The greater air pressure at the farther part of the inner glass then buoys the flame to the region of lesser pressure—inward.

ARBOR SCIENTIFIC
TOOLS THAT TEACH.

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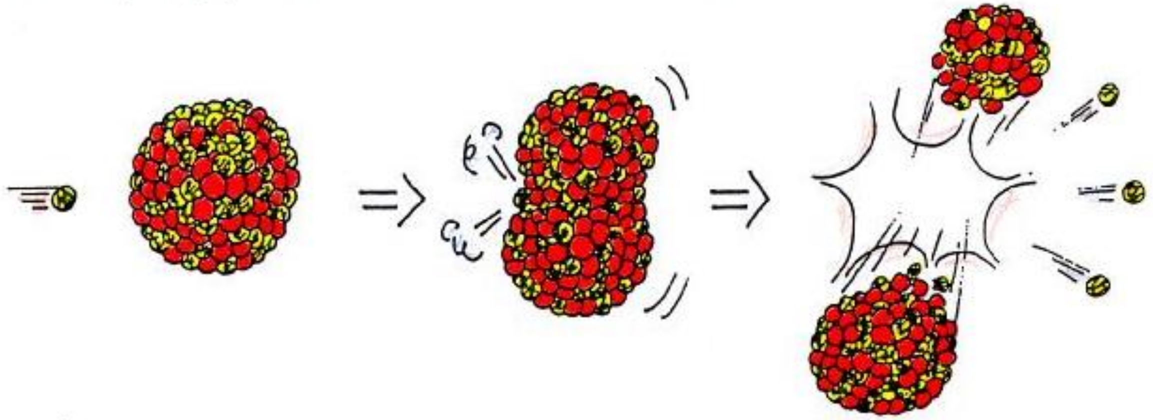

a) gamma rays.

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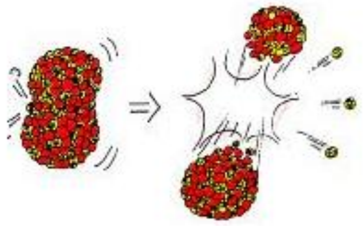
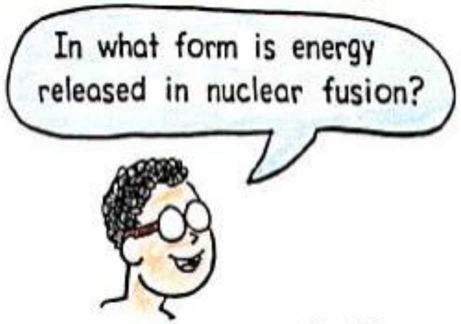


Answer: c. kinetic energy of the fission fragments

Some energy is emitted in the form of gamma rays and some goes into the kinetic energy of emitted neutrons, but most of the energy of nuclear fission is in the kinetic energy of the fission fragments. The positively-charged fragments repel each other and fly apart at high speed. Soon their energy is shared among many atoms as internal energy. It then spreads as heat.



ARBOR SCIENTIFIC

Q8

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CONCEPTUAL Physics

ARBOR SCIENTIFIC
TOOLS THAT TEACH.

Hewitt Drew it!

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Answer: right away

Pour the cream in right away. In so doing, you lighten the color of the coffee. When the coffee is black, it is a better radiator and will cool faster than when it is lighter in color. Perhaps you can think of some other reasons for pouring the cream right away.

CONCEPTUAL Physics

ARBOR SCIENTIFIC
TOOLS THAT TEACH.

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Q9

NEXT-TIME QUESTION

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When playing a violin, the effect produced when the bow is drawn faster across the strings is

a) a higher pitch.

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d) all of the above.

e) none of the above... no discernable effect.

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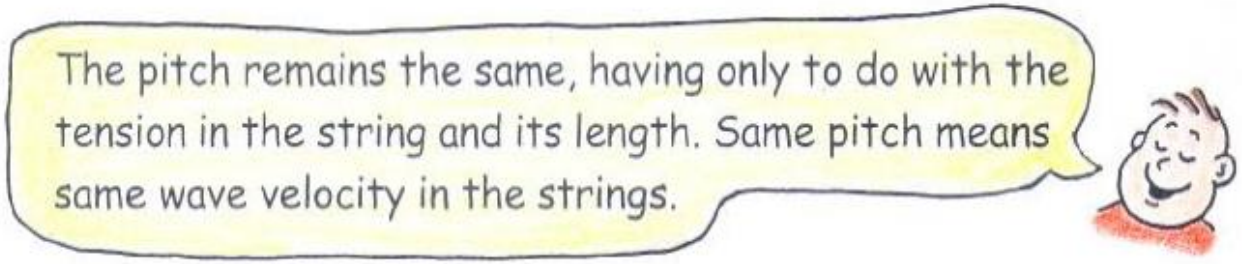
Answer: c, a louder sound

Rosin on the bow ensures enough friction between the string and bow to tug the string sideways, where it snaps back to produce the vibration needed for sound. A faster-moving bow tugs the string farther, increasing the amplitude. This produces a louder sound.



ARBOR SCIENTIFIC

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Q10

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When the series circuit shown to the right is connected, Bulb A is brighter than Bulb B. If the positions of the bulbs were reversed,

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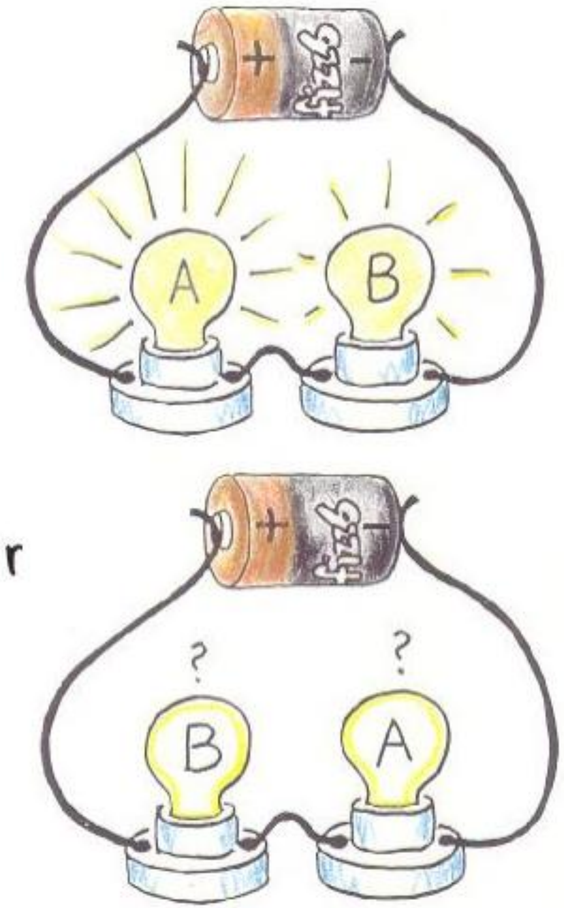

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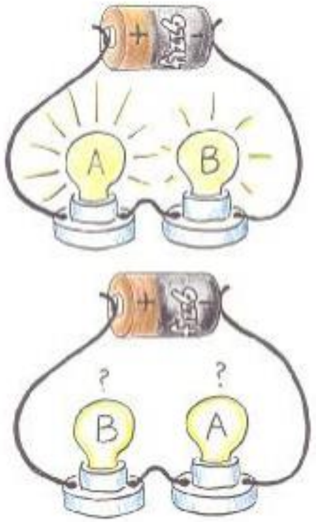


Answer: a

The bulbs are connected in series, so the same current passes through both of them. Different brightnesses indicate different filament resistances. Bulb A is NOT brighter because it is "first in line" for current from the battery! After all, electrons deliver the energy, and they flow from negative to positive—in the opposite direction!

In which bulb is the filament resistance higher?

Which bulb would be brighter if they were connected in parallel?

Hewitt Drew it!

Year 11 to Year 12 Physics Induction – HPL Lesson Focus

Finding Connections – the ability to use **connections** from the **previous learning**

Big Picture Thinking – the ability to work with **big ideas** and **generalised concepts**

Hard Working:

Practice – working to a deadline to gain your best marks for coursework or homework. **Respond to feedback** - become better through **advice and repetition.**

Practice, practice, practice… and plenty of it!

High Performance Learning – Focus for This Lesson

Welcome to A Level Physics at CCS!

Mr D. Robson
Physics Teacher
Head of Physics

Mr J. Krishna
Physics Teacher
Head of KS3

A Level Physics - Topics

Core content

- 1 Measurements and their errors
- 2 Particles and radiation
- 3 Waves
- 4 Mechanics and materials
- 5 Electricity
- 6 Further mechanics and thermal physics
- 7 Fields and their consequences
- 8 Nuclear physics

Options

- 9 Astrophysics
- 10 Medical physics
- 11 Engineering physics
- 12 Turning points in physics
- 13 Electronics

A Level Physics - 12 Assessed Core Practicals

Required activity	
1	Investigation into the variation of the frequency of stationary waves on a string with length, tension and mass per unit length of the string.
2	Investigation of interference effects to include the Young's slit experiment and interference by a diffraction grating.
3	Determination of □ by a free-fall method
4	Determination of the Young modulus by a simple method.
5	Determination of resistivity of a wire using a micrometer, ammeter and voltmeter.
6	Investigation of the emf and internal resistance of electric cells and batteries by measuring the variation of the terminal pd of the cell with current in it.
7	Investigation into simple harmonic motion using a mass-spring system and a simple pendulum.
8	Investigation of Boyle's (constant temperature) law and Charles's (constant pressure) law for a gas.

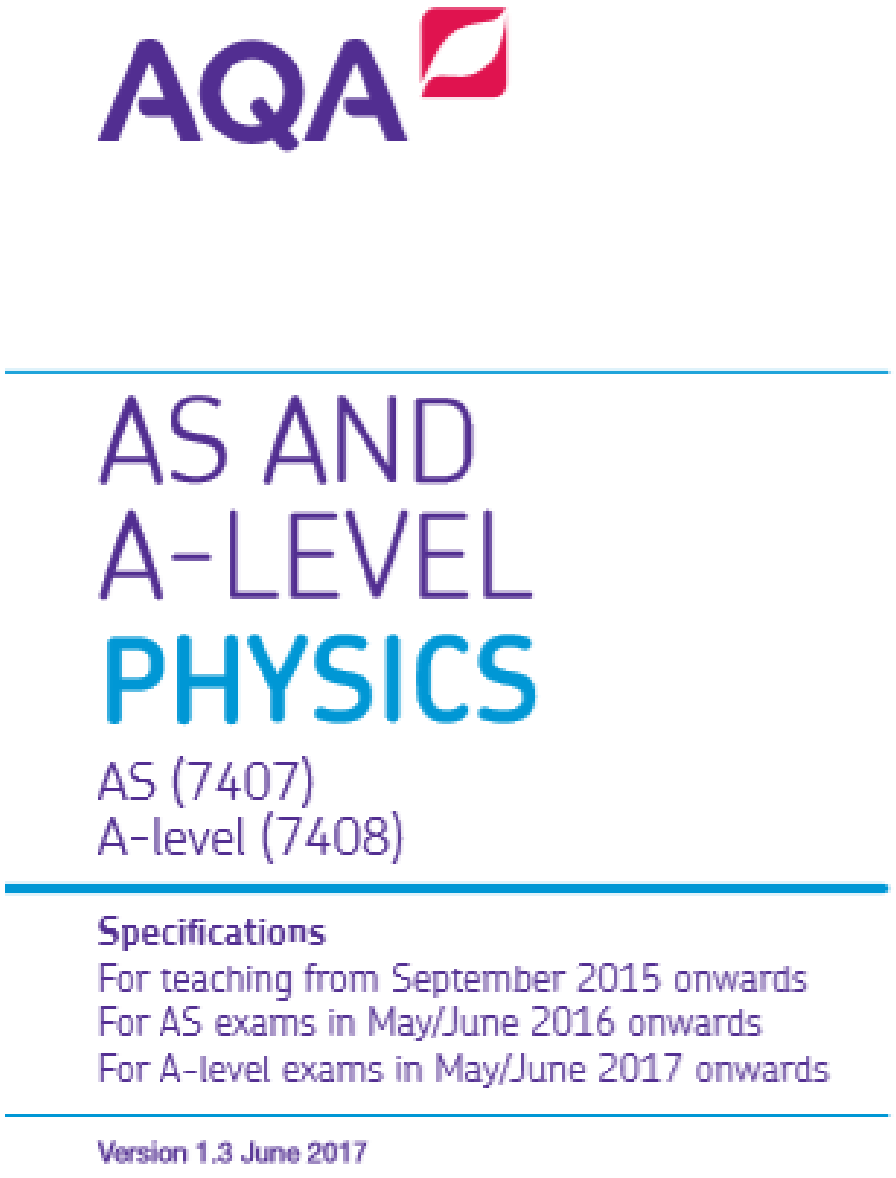
Required activity	
9	Investigation of the charge and discharge of capacitors. Analysis techniques should include log-linear plotting leading to a determination of the time constant □□.
10	Investigate how the force on a wire varies with flux density, current and length of wire using a top pan balance.
11	Investigate, using a search coil and oscilloscope, the effect on magnetic flux linkage of varying the angle between a search coil and magnetic field direction.
12	Investigation of the inverse-square law for gamma radiation.

A Level Physics – Assessment

Assessments

Paper 1	+	Paper 2	+	Paper 3
What's assessed Sections 1–5 and 6.1 (Periodic motion)		**What's assessed** Sections 6.2 (Thermal Physics), 7 and 8 Assumed knowledge from sections 1 to 6.1		**What's assessed** Section A: Compulsory section: Practical skills and data analysis Section B: Students enter for **one** of sections 9, 10, 11, 12 or 13
Assessed • written exam: 2 hours • 85 marks • 34% of A-level		**Assessed** • written exam: 2 hours • 85 marks • 34% of A-level		**Assessed** • written exam: 2 hours • 80 marks • 32% of A-level
Questions 60 marks of short and long answer questions and 25 multiple choice questions on content.		**Questions** 60 marks of short and long answer questions and 25 multiple choice questions on content.		**Questions** 45 marks of short and long answer questions on practical experiments and data analysis. 35 marks of short and long answer questions on optional topic.

Full Information is on line, of course. Search the AQA A-level physics website...


AQA

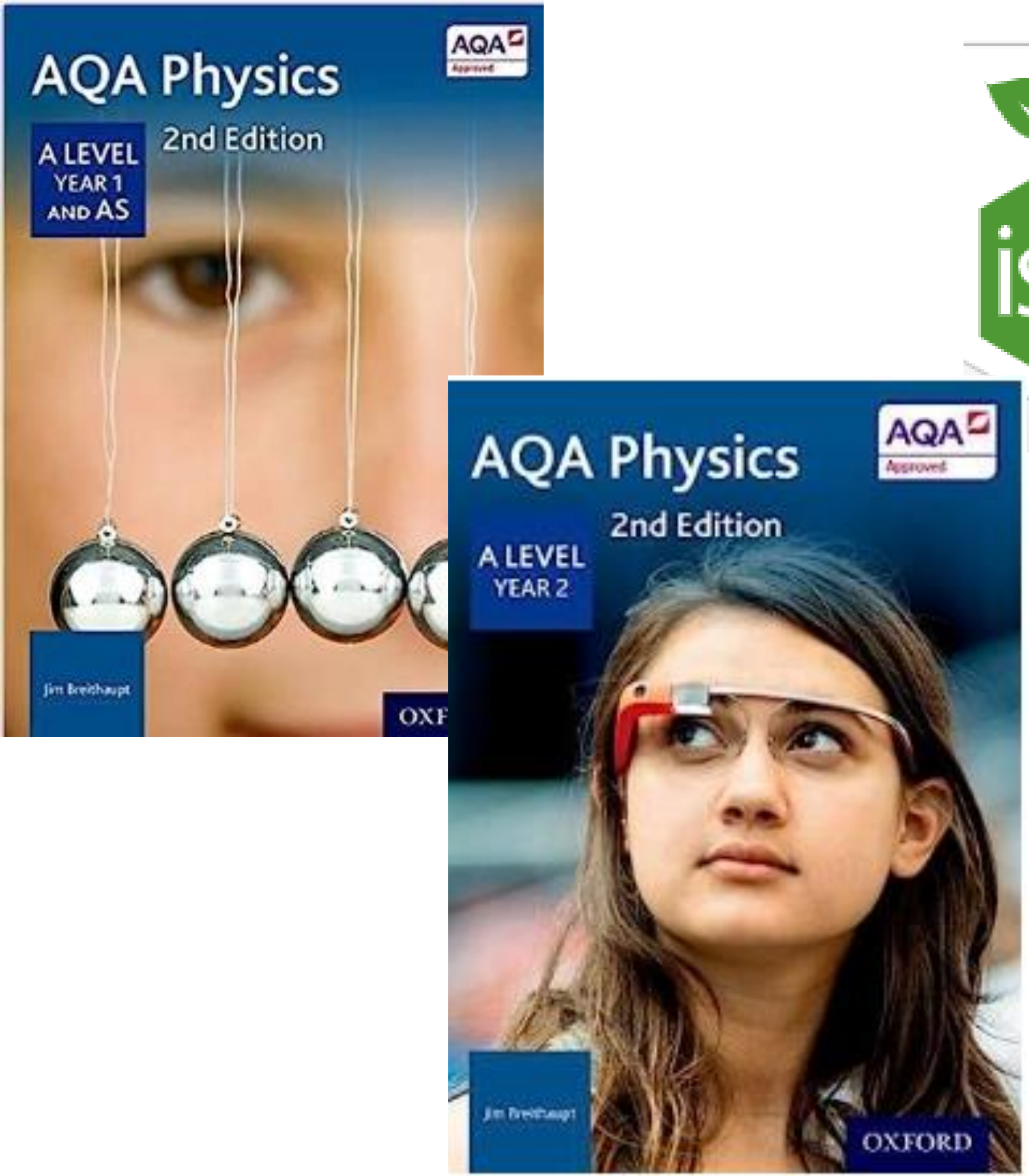
AS AND A-LEVEL PHYSICS

AS (7407)
A-level (7408)

Specifications
For teaching from September 2015 onwards
For AS exams in May/June 2016 onwards
For A-level exams in May/June 2017 onwards

Version 1.3 June 2017

Resources



isaac Physics. You work it out.

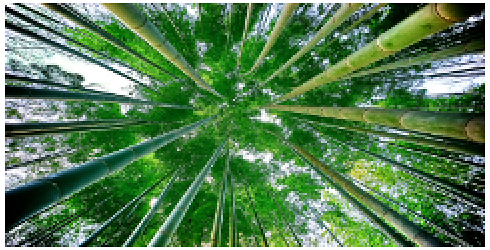
exampro

UP LEARN

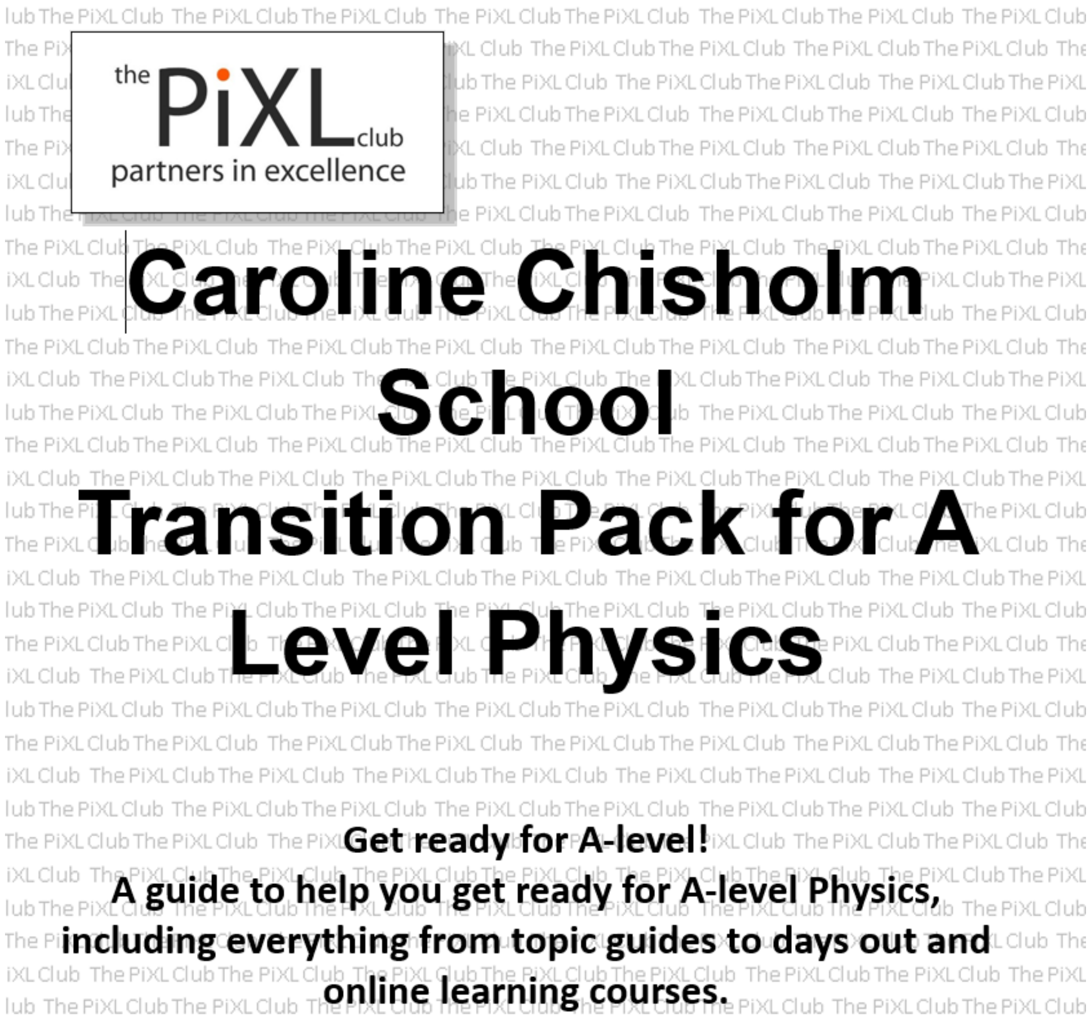
Summer Task

Requirement - All students - Learning how to learn

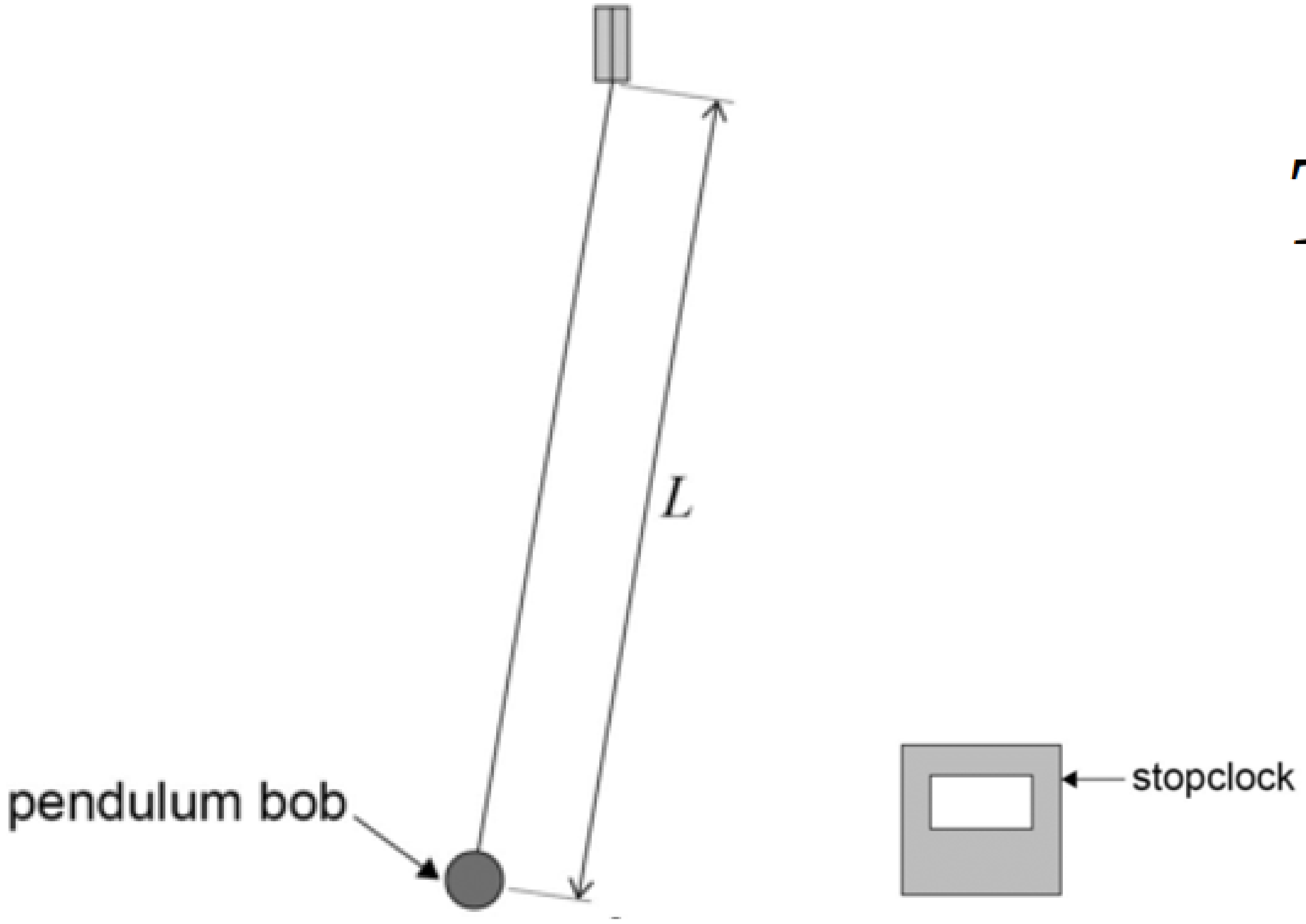
You will all be required to complete the following course:



[Learning how to learn - OpenLearn - Open University]



A brief experiment to estimate g, the strength of the Earth's gravitational field



$$T = 2\pi\sqrt{\frac{L}{g}}$$

A brief experiment to estimate g, the strength of the Earth's gravitational field

	Length (m)	T_{10} Run 1 (s)	T_{10} Run 2 (s)	T_{10} Run 3 (s)	T_{10} Mean (s)	T (s)	**T^2 (s^2)**
Length 1							
Length 2							
Length 3							
Length 4							

Thank you for participating.

Any questions?

Caroline Chisholm School

Ambition Confidence Success

Everyone Every Lesson Every Opportunity