PEARSON EDEXCEL GCSE PHYSICS (HIGHER) · 1PH0

PHYSICS



MARK SCHEME

TOPIC 9: FORCES AND THEIR EFFECTS (PACK 2)

SCORE	PERCENTAGE
/67	%

STEMUP

These questions belong to Pearson Edexcel, not to us.

The examination questions, mark schemes and examiner comments in this pack were written and published by Pearson Edexcel. They are past assessment materials, reproduced here so that students can revise from them.

What we do not own

STEMUP is not affiliated with Pearson Edexcel and does not own, and makes no claim to own, any of the question, mark scheme or examiner report material in this pack. Pearson Edexcel has not endorsed, approved or been involved in the production of it. Pearson Edexcel and the qualification titles used here belong to their respective owners and appear for identification only.

Where to find the originals

Pearson Edexcel publishes its past papers, mark schemes and examiner reports. Always check the current specification at qualifications.pearson.com before you revise, because content and wording can change between series.

If you hold the rights to any material in this pack and would like it amended or removed, contact admin@stemup.co.uk and we will act on it.

Mark Scheme

Q1.

Question number	Answer	Additional guidance	Mark
	an explanation linking distance from hinge/pivot increased (1) (therefore) smaller force needed (to close door)	 P further from hinge than Q accept the greater distance gives greater moment for 2 marks	**(2)**

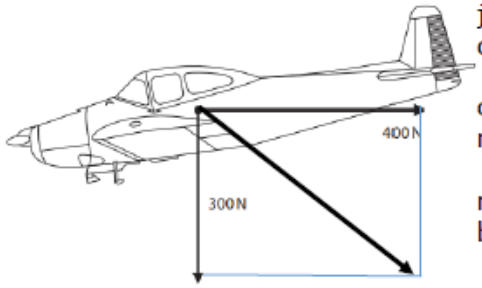
Q2.

Question Number	Answer	Additional guidance	Mark
(i)	recall of moment = force x distance (1) (moment of force from person =) 600 x 0.5 **and** (moment of weight of rock =) 1800 x 0.2 (1) **moment** of force from person is less than **moment** of weight of rock. (1)	may be implied in a calculation 300 (Nm) **and** 360 (Nm) independent mark accept reverse argument	**(3)**

Question Number	Answer	Additional guidance	Mark
(ii)	An explanation that links increase distance between person and pivot/ reduce distance between rock and pivot / increase force from person (1) increase the moment of the force from the person / decrease the moment of the weight of the rock (1)	 use longer lever / hold lever nearer the end / move pivot nearer to rock / get someone to help to push value of new distance and calculation of new moment	(2)

Q3.

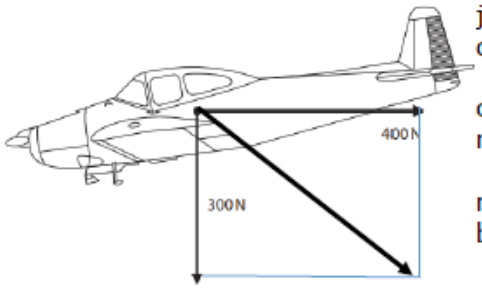
Question Number:	Answer	Additional guidance	Mark
(i)	0.9 (k N) (1) up / upwards / ascending (1)	accept .9 or 0.90 north N ↑	(2) AO 3 2a AO 3 2b

Question Number:	Answer	Additional guidance	Mark
(ii)		judge length and direction by eye construction lines need not be shown magnitude need not be stated allow missing arrowhead if direction and length are correct reject answers which have any additional vectors drawn	(1) AO 3 2b

Question Number:	Answer	Additional Guidance	Mark
(iii)	recall and substitution (1) GPE = 750 x 10 x 1300 evaluation (1) (energy =) 9 800 000 (J)	 no POT error (could have missed out g) allow answers in standard form 9.8×10^6 allow answers that round to 9 800 000 e.g. 9 750 000 J allow 9800 kJ or 9.8MJ allow 9 555 000 J allow negative values award full marks for correct answer without working	**(2)** AO 2 1

Q4.

Question Number:	Answer	Additional guidance	Mark
(i)	0.9 (k N) (1) up / upwards / ascending (1)	accept .9 or 0.90 north N ↑	**(2)** AO 3 2a AO 3 2b

Question Number:	Answer	Additional guidance	Mark
(ii)		judge length and direction by eye construction lines need not be shown magnitude need not be stated allow missing arrowhead if direction and length are correct reject answers which have any additional vectors drawn	**(1)** AO 3 2b

Question Number:	Answer	Additional Guidance	Mark
(iii)	recall and substitution (1) GPE = 750 x 10 x 1300 evaluation (1) (energy =) 9 800 000 (J)	 no POT error (could have missed out g) allow answers in standard form 9.8×10^6 allow answers that round to 9 800 000 e.g. 9 750 000 J allow 9800 kJ or 9.8MJ allow 9 555 000 J allow negative values award full marks for correct answer without working	**(2)** AO 2 1

Q5.

Question Number	Answer	Acceptable answers	Mark
(i)	force (1)	If than one word given then 0 marks.	**(1)**

Question Number	Answer	Acceptable answers	Mark
(ii)	B 0.07kg		**(1)**

Question Number	Answer	Acceptable answers	Mark
(iii)	Arrow pointing (vertically) upwards (1) Value of 1.2 (N) (written near to arrow) (1)	Marks are independent of each other	**(2)**

Q6.

Question Number	Answer	Acceptable answers	Mark
(i)	force (1)	If than one word given then 0 marks.	**(1)**

Question Number	Answer	Acceptable answers	Mark
(ii)	B 0.07kg		**(1)**

Question Number	Answer	Acceptable answers	Mark
(iii)	Arrow pointing (vertically) upwards (1) Value of 1.2 (N) (written near to arrow) (1)	Marks are independent of each other	**(2)**

Q7.

Question number	Answer	Additional guidance	Mark
(i)	D R and S A, B and C are incorrect because the difference in vertical positions are all less than that shown by R and S		(1) AO1

Question number	Answer	Additional guidance	Mark
(ii)	recall (1) work done = force x distance substitution and evaluation (1) (work done =) 14,000 (J)	(work done) = 700 x 20 award full marks for the correct answer without working	(2) AO1

Question number	Answer	Additional guidance	Mark
(iii)	substitution (1) 11250 = m x 10 x 15 rearrangement and evaluation (1) (mass=) 75 (kg)	 award full marks for the correct answer without working. if no other marks scored then award 1 mark for answers of 0.013 (substitution mark using h = 15)	(2) AO2

Question number	Answer	Additional guidance	Mark
(iv)	An explanation linking some work is done to overcome friction/air resistance (1) energy is dissipated /transferred to the environment (1)	 allow energy is lost thermal energy	(2) AO1

Question number	Answer	Additional guidance	Mark
(v)	C increase the efficiency of the cyclist and bicycle A is incorrect because lubrication has no effect on work done against gravity B is incorrect because lubrication will increase efficiency D is incorrect because the overall energy transfer will not increase		**(1)** **AO1**

Q8.

Question number	Answer	Additional guidance	Mark
(i)	D R and S A, B and C are incorrect because the difference in vertical positions are all less than that shown by R and S		**(1)** **AO1**

Question number	Answer	Additional guidance	Mark
(ii)	recall (1) work done = force x distance substitution and evaluation (1) (work done =) 14,000 (J)	(work done) = 700 x 20 award full marks for the correct answer without working	**(2)** **AO1**

Question number	Answer	Additional guidance	Mark
(iii)	substitution (1) 11250 = m x 10 x 15 rearrangement and evaluation (1) (mass=) 75 (kg)	award full marks for the correct answer without working. if no other marks scored then award 1 mark for answers of 0.013 (substitution mark using h = 15)	**(2)** **AO2**

Question number	Answer	Additional guidance	Mark
(iv)	An explanation linking some work is done to overcome friction/air resistance (1) energy is dissipated /transferred to the environment (1)	allow energy is lost thermal energy	**(2)** **AO1**

Question number	Answer	Additional guidance	Mark
(v)	C increase the efficiency of the cyclist and bicycle A is incorrect because lubrication has no effect on work done against gravity B is incorrect because lubrication will increase efficiency D is incorrect because the overall energy transfer will not increase		**(1)** **AO1**

Q9.

Question number	Answer	Mark
	An answer that combines points of interpretation/evaluation to provide a logical description: Use of lubrication / oil (1) To reduce friction (between parts) (1)	**(2)**

Q10.

Question number	Answer	Mark
	An answer that combines points of interpretation/evaluation to provide a logical description: Use of lubrication / oil (1) To reduce friction (between parts) (1)	**(2)**

Q11.

Question number	Answer	Mark
	An explanation identifying the fact that the forces shown are acting on two different bodies / they are not acting on the same body (1)	**(1)**

Q12.

Question number	Answer	Mark
	An explanation identifying the fact that the forces shown are acting on two different bodies / they are not acting on the same body (1)	**(1)**

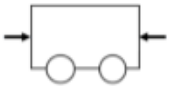
Q13.

Question number	Answer	Mark
	C a javelin moves through the air after leaving an athlete's hand	**(1)**

Q14.

Question number	Answer	Mark
	C a javelin moves through the air after leaving an athlete's hand	**(1)**

Q15.

Question number	Answer	Mark
	B  A, C and D are incorrect because they all show a resultant force which would cause the trolley to accelerate	**(1)**

Q16.

Question number	Answer	Mark
	B  A, C and D are incorrect because they all show a resultant force which would cause the trolley to accelerate	**(1)**

Q17.

Question Number	Answer	Mark
	The only correct answer is B: force Q **A is incorrect** because the moment of force P about the axle is zero. **C is incorrect** because moment of force R about the axle is zero. **D is incorrect** because moment of force S about the axle is zero.	**(1)**

Q18.

Question number	Answer	Mark
	B  A,C and D are incorrect as the forces would cause the seesaw to turn	**(1)**

Q19.

Question number	Answer	Additional guidance	Mark
	Any three from: • use a higher current as the force depends on the current (1) • use more/stronger/larger range of magnets (1) • use a force meter with smaller range, e.g. 0.00 to 0.01 (1) • use a longer distance from pivot to increase the moment of the force on the wire (1)	accept voltage for current add variable resistor (in series) with power supply accept use more sensitive force meter	**(3)**

Q20.

Question number	Answer	Additional guidance	Mark
(i)	An explanation that combines identification – application of knowledge (1 mark) and reasoning/justification – application of understanding (1 mark): • frictional forces increase as more trucks are added (1) Plus **one** from: • hence, in order to keep constant speed, the student must increase the force she applies to **Z** (1) • when **Y** and **Z** separate, the frictional forces (to the left) are more than magnetic attraction between **Y** and **Z** (1)		**(2)**

Question number	Answer	Mark
(ii)	An answer that combines the following points to provide a plan: • use of a Newton meter used horizontally (1) • record largest force observed (1) • repeat readings several times under same conditions (1)	(3)

Question number	Answer	Mark
(iii)	An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (1 mark): • the applied force must be resolved horizontally to determine the force that separates the engine from the trucks • and since the (size of) the resolved force is always less than the (size of) the actual force then a larger force (applied at an angle) is needed to separate the trucks from the engine	(2)

Q21.

	Answer	Acceptable answers	Mark
(i)	B to the left ←		(1)
(ii)	A accelerating		(1)
(iii)	substitution 625 × 10 (1) Evaluation 6250 (N) (1)	625 × 9.8 6125 (N) give full marks for correct answer, no working	(2)

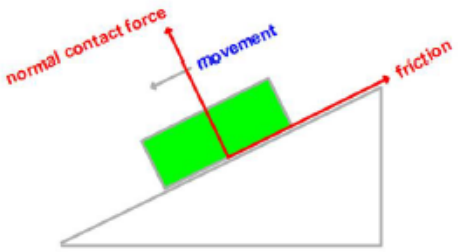
Q22.

	Answer	Acceptable answers	Mark
(a)(i)	B to the left ←		(1)
(a)(ii)	A accelerating		(1)
(a)(iii)	substitution 625x 10 (1) Evaluation	625 x 9.8 6125 (N)	(2)

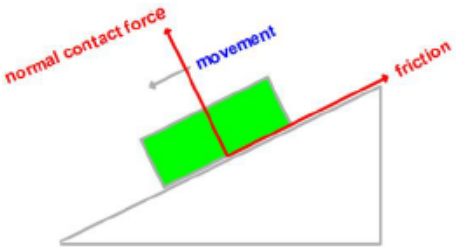
	6250 (N) (1)	give full marks for correct answer, no working	
(b)(i)	 (1) air resistance (1)	upward arrow on any part of line vertical line from any point on the diagram air friction, upthrust, drag Ignore any downward arrow labelled weight or gravity	**(2)**
(b)(ii)	Balanced (1) Zero (1)		**(2)**

Total for marks for question = 8

Q23.

Question number	Answer	Additional guidance	Mark
	• An arrow showing the 'normal contact force' - from between the two surfaces, acting upwards (1) • An arrow showing the 'friction' force – from between the two surfaces (1) • Both forces in the correct directions, as shown (1) 	generally upwards / away from the surface can be to the left or to the right they do not need to start from the same point	**(3)**

Q24.

Question number	Answer	Additional guidance	Mark
	• An arrow showing the 'normal contact force' - from between the two surfaces, acting upwards (1) • An arrow showing the 'friction' force – from between the two surfaces (1) • Both forces in the correct directions, as shown (1) 	generally upwards / away from the surface can be to the left or to the right they do not need to start from the same point	(3)

Q25.

Question number	Answer	Additional guidance	Mark
	(sum of) the clockwise moments = (sum of) the anticlockwise moments	moment of magnet = moment of modelling clay moments are equal (size)	**(1)** **AO1**

Q26.

Question number	Answer	Mark
(i)	B 1 | same as P **The only correct answer is B** ***A*** *is incorrect because the number of teeth on P and R are equal* ***C*** *is incorrect because Q reverses the rotation of P and then R reverses the rotation of Q* ***D*** *is incorrect because Q reverses the rotation of P and then R reverses the rotation of Q*	**(1)** AO 1 1

Question Number:	Answer	Additional Guidance	Mark
(ii)	use of distance = pitch x number of teeth (moved) (1) evaluation (1) (distance =) 20 (mm)	allow first mark if 2 x 4 (=8) or 2 x 40 (=80) seen award full marks for correct answer without working	**(2)** AO 1 1

Q27.

Question number	Answer	Mark
	B	**(1)**

Q28.

Question number	Answer	Mark
	☒ **A** acceleration This is the only vector quantity from the options given	**(1)** **AO1.1**