



Mark Scheme (Results)

Summer 2018

Pearson Edexcel GCE Advanced Subsidiary
In Design and Technology: Resistant Materials
6RM02/01

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Summer 2018

Publications Code 1806_6RM02_01

All the material in this publication is copyright

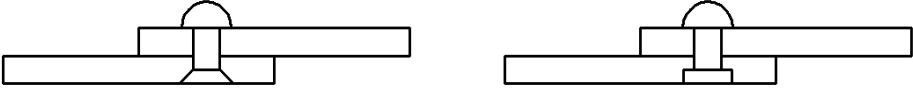
© Pearson Education Ltd 2018

General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question Number	Answer	Mark
1(a)	The following answer: Acrylic / Perspex / Crylux / Plexiglas / Acrylite / Lucite / PMMA / PMA (1) Accept any other spelling variation of 'Acrylic/Perspex' (1x1)	1
1(b)	The two following hazards: 1. Reaction to vapours / fumes and symptoms that arise from them (1) 2. Vapours can be flammable. (1) Do not accept responses arising from physical contact with adhesive. (2x1)	2
1(c)	Stem: strength. Any five of the following points:- 1. Drying /curing time (1) 2. Clamping issues (availability of clamps, size of area, curved) (1) 3. Ease of positioning / type of joint(1) 4. Hazards to health (1) 5. Cost (1) 6. The method of application / easy to use (1) 7. Staining (1) 8. Colour it dries (1) 9. Environment to be used in / waterproof / outdoor usage (1) 10. Presence of a finish (1) (5x1)	5
Total for Question		8

Question Number	Answer	Mark
2(a)	The following polymer :- Polypropylene / PP (1) Accept any other spelling of polypropylene. (1x1)	1
2(b)	Stem: strength, toughness. Any four of the following mechanical properties:- 1. Flexibility / malleable / can be bent (1) 2. Elasticity / springiness (1) 3. Hardness / scratch resistant (1) 4. Fatigue resistant / withstand repeated bending (1) 5. Creep resistant / stable / the clip should resist deforming under constant load (1) (4x1)	4
2 (c)	Stem: dimensional accuracy. Any three of the following functional checks:- 1. Check the DVD clips function appropriately / holds a disc / easy to insert and extract. (1) 2. Check the case clips work appropriately. (1) 3. Check that the hinge opens and closes / how many times it opens and closes before it splits. (1) 4. Check that the case is sufficiently robust against bangs, drops, scratches, forces, liquids, heat to protect the DVD (1) 5. Check that a sleeve can be inserted / fits into the cover opening. (1) 6. Check the leaflet clips functions appropriately. (1) (3x1)	3
Total for Question		8

Question Number	Answer	Mark
3(a)	The following two features shown in the diagram: 1. Snap head / domed head (1) 2. Countersunk / counter-bored head flush with surface (1)  Do not accept annotation stating it is flush when the diagram isn't. (2x1)	2
3(b)	Any two of the following points with linked explanations. 1. Faster to fit (1) so less labour needed (1) 2. Increased production rate (1) which saves money. (1) 3. Only need access to one side of the material (1) so can be fitted in more awkward / wider range of situations. / as pulling the mandrel from one side will splay the rivet on the other. (1) 4. They do not need as much effort to fit (1) as the rivet gun increases the force / as they don't need repeated beating with a hammer. (1) 5. They do not need as much skill to fit (1) as rivet guns are straightforward to use / less training is needed. (1) 6. No risk of damage to the surrounding metal (1) as they do not require hammering / as hammer misses are likely with snap rivets.(1) 7. They are simpler to remove (1) as they can be punched / drilled out / are made of a soft material. (1) Do not accept 'easier' as this is too vague. (2x2)	4

3(c)	Any five of the following points, but must include at least one disadvantage for full marks:- Advantages: 1. Roller followers can run faster. (1) 2. Roller can take greater loads / stronger. (1) 3. Roller produces less friction / less heat / turns easier / smoother / pass over any small blemishes on the cam profile / allows cam to be made of a softer material. (1) 4. Roller will wear less / longer lasting / more durable (1) 5. Roller requires less lubrication/maintenance/replacement (1) Disadvantages: 6. Roller will not accurately follow tight internal contours / gives a less precise motion transferred. (1) 7. Roller is more expensive to manufacture. (1) 8. Roller needs more space as it is a larger component. (1) Accept any of the above points stated in the reverse format. (5x1)	5
	Total for Question	11

Question Number	Answer	Mark
4(a)	Stem: Head gear, gauntlets and apron. Any three of the following forms of PPE:- 1. Protective / leather / toe cap shoes / shoe covers (1) 2. Spats / gaiters / protective trousers (1) 3. Protective sleeves (1) 4. Respirator / gas mask (1) Do not accept goggles or dust mask or face mask. (3x1)	3
4(b)	Any three of the following points linked with any relevant explanations also from the following points:- 1. The die / mould doesn't get broken / is reusable (1) 2. Faster process (1) 3. Die is kept cool / water cooled (1) 4. More automated / less labour / less skill (1) 5. More products can be made/meet large demand/mass produced (1) 6. Cheaper for long production runs / economies of scale (1) 7. Better surface finish / less blemishes (1) 8. Machined metal mould surface is smoother than sand (1) 9. Less follow up processing is required (1) 10. More complex / detailed / smaller mouldings (1) 11. Steel die is stronger / can be machined more intricately than a sand mould / thinner sections / injected at higher pressure (1) 12. More consistent / reliable mouldings produced / higher success rate (1) 13. Less prone to human error (1) 14. Safer process / reduced risk of injury / moisture explosion (1) 15. Less fumes / fully enclosed / no pouring metal / risk of spillage (1) 16. Less waste (1) 17. Smaller sprues (1) Do not accept 'higher quality' as this is too vague. Do not accept 'lower temperatures' as either can be high or low. (3x2)	6
Total for Question		9

Question Number	Answer	Mark
5(a)	Stem: Strong, durable. Any seven of the following properties:- 1. Corrosion / stain / chemical / water resistant / low maintenance (1) 2. Toughness (1) 3. Good aesthetics / finish / smooth / shiny (1) 4. Malleable / plasticity / can be bent (1) 5. Fusible / weld-able (1) 6. Hard / scratch resistant (1) 7. Machinable / can be cut / drilled (1) 8. Low buoyancy / dense Do not accept vague terms such as 'easily joined', 'easily shaped'. (6x1)	6
5(b)	Stem: safer, increased sales. Any eight of the following points, although it must contain at least one positive and one negative impact in order to gain full marks:- Positive 1. Increased customer reputation / trust / satisfaction / positive reviews. (1) 2. Increased profits / competitiveness. (1) 3. Legal protection in the event of a consumer accident. (1) 4. Reduced after sales costs / returned products. (1) 5. BSI standards are internationally recognized making compliance with foreign standards / international sales easier. (1) 6. Staff more motivated (leading to improved morale / job satisfaction / increased productivity / less staff absence / less faulty products / less waste). (1) 7. Attract more highly skilled workers / investors. (1) 8. Easily replace parts from standard components. (1) Negative 9. Additional costs (arising from increased quality control checks / getting products tested by BSI / setup costs / increased wages). (1) 10. Reduced productivity (arising from time delays / longer time to market due to additional manufacturing / testing / administration procedures). (1) 11. Customers may not recognize the mark limiting its effects (1) 12. Resulting higher retail price may reduce sales / profits. (1) - Do not accept statements concerning 'increasing the quality of the product' as the question is focused on the effects on the business once the product has already achieved the BSI quality standard. - Do not accept issues related to 'improved working conditions' as the focus is on how the products' compliance with the standard affects the business, not the effects of the business's compliance with ISO.9000. (8 x1)	8
	Total for Question	14

Question Number	Answer	Mark
6 (a)	The following answer:- Photochromic / photochromatic / photosensitive (1) Accept all words above with/without 'paint', 'stimulus' and 'pigment' (1x1)	1
6 (b)	Stem: minimal power, thin. Any nine of the following points:- 1. Requires only small batteries 2. Batteries last a long time (1) 3. Cheap to manufacture (1) 4. Environmentally friendly / eco-friendly / sustainable (1) 5. Not affected by water / water proof (1) 6. Tough / robust (1) 7. Reliable / durable / long lasting (1) 8. Lightweight (1) 9. Do not get hot (1) 10. Even illumination across the whole panel (1) 11. Wide viewing angle (1) 12. Instant light / no flicker / no warm-up delay (1) 13. Can be made in any flat shape (1) 14. No glare / emits comfortable low light level / light level can be controlled / no eye strain (1) 15. Available in a range of colours (1) Do not accept 'flexible' or 'bent to a curve' as this situation does not need these characteristic (1x9)	9
Total for Question		10

Question Number	Answer	Mark
7	Stem: cheapest, fastest, large demand. Any ten of the following points, although it must contain at least one advantage and one disadvantage in order to gain full marks:- Advantages 1. They produce large quantities of the product. (1) 2. Maximizes profits. (1) 3. Production runs 24/7 / through the night / not affected by worker breaks / no down time between shifts. (1) 4. Highly automated / minimal labour / unskilled labour. (1) 5. Minimizes waste / human error / consistent product quality / accurate / precise. (1) 6. Safer systems as workers are more isolated from machinery. (1) 7. Energy is not wasted stopping and re-starting machines, Eg. Reheating cold moulding machines. (1) 8. Economies of scale / economic bulk buying / transporting of raw materials. (1) 9. Very consistent production rate. (1) 10. Allows accurate order prediction / completion. (1) 11. Set-up costs quickly recouped. (1) 12. Minimum planning / management needed once set up. (1) 13. Design is not expected to change in the near future. (1) Disadvantages 14. Expensive to set up. (1) 15. Long lead time needed to set up manufacturing systems (1) 16. Inflexible / difficult to change design / production speed if demand fluctuates. (1) 17. A faulty machine may cause much waste if not quickly noticed. (1) 18. Greater risk of being left with unsold stock. (1) 19. Maintenance becomes very important / expensive. (1) 20. The whole production line would have to stop in the event of a breakdown / delivery delay / etc.(1) 21. Low worker morale / low job satisfaction / machine minding. (1) Do not accept 'produces high quality products' as this is the same for all production levels. (10 x 1)	10
	Total for Question	10