

Mark Scheme (Results)

January 2012

Principal Learning
CB301 Design the Built Environment:
The Design Factors

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications come from Pearson, the world's leading learning company. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information, please call our GCE line on 0844 576 0025, our GCSE team on 0844 576 0027, or visit our qualifications website at www.edexcel.com. For information about our BTEC qualifications, please call 0844 576 0026, or visit our website at www.btec.co.uk.

If you have any subject specific questions about this specification that require the help of a subject specialist, you may find our Ask The Expert email service helpful.

Ask The Expert can be accessed online at the following link:

<http://www.edexcel.com/Aboutus/contact-us/>

Pearson: helping people progress, everywhere

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 raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

January 2012

Publications Code DP030293

All the material in this publication is copyright

© Pearson Education Ltd 2012

Question Number	Answer	Mark
1 (a)	<p>Low speed areas –</p> <p>Description of any two of the following methods:</p> <ul style="list-style-type: none"> • The use of road humps to reduce the speed of vehicles on housing estate roads where pedestrian activity is high (1). The optimum location of the road humps, to avoid ‘rat runs’, not suitable for bus routes (1). • The use of road narrowing acts as a reminder/encouragement to drivers of vehicles especially HGVs to reduce their speed (1). The location of the road narrowing should not affect opposing traffic flow; the reduced carriageway can be paved and used for pedestrians or cycle lanes (1). • The use of a chicane creates a horizontal deflection/change of direction that causes vehicles to reduce speed (1). The optimum location of the chicane should consider HGVs, wide goods vehicles etc. (1). • The use of a cul-de-sac reduces traffic speed by not allowing through traffic (1). It suggests that access is only available to the vehicles that are owned by people who live in the vicinity, or are visiting (1). • The purpose of footpath widening is to improve safety for pedestrians (1). The footpath can be constructed to also accommodate a cycle lane (1). • The use of a different colour/texture of the road surface, including surface marking can define a specific use for the road e.g. cycle lane or point of potential conflict (1). Similarly rows of cobbles at the junction of a minor road can indicate to drivers that they are entering a low speed area (1). • Pedestrian crossings should be located away from conflict points i.e. busy junctions to give drivers an opportunity to slow down and brake safely (1). The optimum location for a crossing allows people to see and be seen by approaching traffic (1). 	

	<ul style="list-style-type: none"> • The purpose of a roundabout is to minimise delay for vehicles whilst maintaining the safe passage of all users including cyclists (1). A splitter island for pedestrians on the approach to the roundabout will further reduce traffic speed (1). • Raised junctions are full width, rectangular road humps in the centre of a crossroads forcing traffic entering from all directions to slow down (1). Optimum designs leave space round the edges for cyclists to pass freely (1). • The use of electronic speed indicator signs has the effect of causing drivers to reduce their speed as they approach the unit (1). They are considered to be effective as they are non-confrontational. Most effective when the location of the unit is regularly moved (1). • The use of speed cameras has the effect of causing drivers to reduce their speed as they approach the unit irrespective of it being activated (1). The use of average speed cameras can be a further effective speed reduction measure (1). • The purpose of general speed signage is to improve road traffic safety and accidents from collisions (1). The signage usually defines the maximum permitted speed but can depict the minimum permitted speed (1). <p>Any other appropriate answer. No marks for identification only 1 mark for a brief description 2 marks for a clear description</p>	(4)
--	---	------------

Question Number	Answer	Mark
1 (b)	Rainwater harvesting – Description of any two of the following features: <ul style="list-style-type: none"> • To provide collection of the rainwater (1) by means of roofs, hard surfaces etc (1). • To provide filtration of the rainwater 	

	<p>from roofs (1) first flush system to get rid of debris; permanent filter system; screens in downpipes/tank inlet to trap leaves (1).</p> <ul style="list-style-type: none"> • To provide filtration of the rainwater from hard surfaces (1) gravel-sand filters at the entrance to the storage tank (1). • To provide storage of the rainwater (1) by means of surface or above ground tanks for roof collection. Sub-surface/underground tanks for ground catchment systems (1). • To provide uses of the rainwater (1) to supply toilets, washing machines, car washing, garden watering etc. (1) • To provide a connection to SUDS (1) to collect water into lakes, ponds and reed beds (1). <p>Any other appropriate answer. No marks for identification only 1 mark for a brief description 2 marks for a clear description</p>	(4)
--	---	------------

Question Number	Answer	Mark
2	<p>Availability of land –</p> <p>Description of any three of the following ways:</p> <ul style="list-style-type: none"> • The influence of the Local Authority Planning Department (1) when setting an allowable density of houses etc. per hectare (1). • The use of medium and high-rise buildings (1) that create more floor area on the same footprint (1). • The location of the land as the owner of land in the centre of a town or city may be able to achieve a higher price if used for commercial buildings. The proximity of the land to transport links/networks. (1). Low cost of the land could encourage affordable housing for key workers etc. (1). • The cost of the land may affect the feasibility of the proposed development (1). Therefore other uses for the land may have to be considered (1). • The cost of the land will vary 	

	<p>depending upon the economic climate (1) at the time affecting the availability (1).</p> <ul style="list-style-type: none"> • The effect of any easements (interest in the land by the owner) (1) restrictive covenants, rights-of-way etc. that are attached to the land (1). • The availability of local grants (1) for use of brownfield sites etc (1). • The influence of planning issues in terms of designation for use (1) agricultural, industrial etc (1). • Desirable residential locations can have limited land availability (1) that affects the price of land and subsequent development (1). • The provision of car-parking and other external features. • The potential use of basements and underground car-parking. <p>Any other appropriate answer. No marks for identification only. 1 mark for a brief description 2 marks for a clear description</p>	(6)
--	---	------------

Question Number	Answer	Mark
3	<p>Benefits of SUDS –</p> <p>Description of any three of the following benefits:</p> <ul style="list-style-type: none"> • Reduces run-off of rainwater from hard paving and roofs (1) that can increase the risk of flooding downstream; sudden rises in water levels and flow rates in watercourses (1). • Reduces contaminants that can be contained in surface water run-off (1) such as oil, organic matter, toxic metals etc. (1) • Better water quality (1) that can encourage biodiversity (1). • Enhances the general amenity (1) through an increased recreation value of the waterway/river (1). • By not diverting rainfall to piped systems, water can soak into the ground increasing levels of groundwater (1) and improving the flow of watercourses in dry weather 	

	<ul style="list-style-type: none"> (1). • Reduces power consumption at the water treatment plant (1) and pumping stations (1). <p>Any other appropriate answer. No marks for identification only 1 mark for a brief description 2 marks for a clear description</p>	(6)
--	---	------------

Question Number	Answer	Mark
4	<p>Climate-related effects –</p> <p>Description of any four of the following effects:</p> <ul style="list-style-type: none"> • The orientation of the building (1) could result in penetration of sunlight into rooms and spaces at different times of the day (1). • Housing – kitchens and bedrooms located on the east side of the building to benefit from the morning sun (1); living rooms on the west and south for the afternoon sun (1). • Office buildings – preferably east facing as work places are more comfortable (1); whereas, west and south facing offices can become warm on summer afternoons (1). • Studio/factory buildings – preferably north facing windows (1) to benefit from constant light (1). • Increased daylight can result in increased heat gain (1) therefore louvres or reflective glazing may be required (1). • Buildings act as obstructions to the wind (1) so the height and width of a building needs to be considered (1). • The design of vulnerable elements such as the roof including its pitch and coverings (1), together with the type of external cladding (1). • Roof overhangs/soffits/canopies provide protection of the external fabric (1), windows and doors from rain penetration (1). • The location/layout of buildings on the site (1) e.g. when a number of buildings are used by the same people requiring frequent access, covered 	

	<p>walkways should be provided (1).</p> <ul style="list-style-type: none"> • The quality of the materials used to construct the external fabric (1) and the subsequent reduction in permeability of the external fabric (1). • Cold air entering the building at openings in the external fabric (1) provision of draught proofing for external doors and windows (1). • High levels of rainfall would increase the levels of surface water (1) but could facilitate the use of rainwater harvesting systems (1). • In sunny locations specification of materials that less prone to fading. • Use of window shutters or brise soleil. • Detailing of the external envelope to cope with wind loads. • Use of heat insulating glass. • Extreme cold climates will require higher levels of insulation. <p>Any other appropriate answer. No marks for identification only 1 mark for a brief description 2 marks for a clear description</p>	(8)
--	---	------------

Question Number	Answer	Mark
5	<p>Functional requirements of a roof –</p> <p>Description of any three of the following requirements:</p> <ul style="list-style-type: none"> • Strength of the roof – supports the dead loads of the roof members and coverings together with any imposed loads such as snow and wind without deflection (1). Pitched roofs rely on triangulation of the members i.e. ties and struts, whereas flat roofs rely on support from the walls and the depth of the joists (1). • Stability of the roof – Retaining straps, shoes etc. fixed to the inner leaf prevent uplift (1), timber bracing resists racking of trussed rafters (1). • Resistance to weather – to exclude rain and snow etc. (1) as regular rain penetration will cause degradation of the internal fabric, ceilings, roof structure etc. (1). • Durability of the roof – depends 	

	<p>largely on the ability of the roof's covering to exclude rain because regular penetration will cause the roof structure to decay or corrode (1). Tiles and slates are largely maintenance free, whereas most flat roof coverings have a limited lifespan (1).</p> <ul style="list-style-type: none"> • Fire safety – Approved Document B fire resistance is required to limit the spread of flame across the surface of the roof covering to adjacent buildings (1) and the means of escape to a place of safety (1). • Resistance to the passage of heat – the roof structure's materials and coverings are poor insulators against the transfer of heat (1). To comply with Approved Document L some form of insulation will be required (1). • Resistance to the passage of sound – not usually a consideration owing to the mass of the roof covering (1). This may be a problem with airborne sound if close to an airport or busy road (1). • Air leakage – efficient ventilation is required to prevent condensation in the roof space (1) that can cause timber to rot or metal to corrode (1). • Aesthetics – appearance will largely be influenced by the context (1) and locality of the building (1). • The ability to shed rainwater with appropriate drainage. <p>Any other appropriate answer. No marks for identification only 1 mark for a brief description 2 marks for a clear description</p>	(6)
--	--	------------

Question Number	Answer	Mark
6	<p>Consequences of periods of boom and bust of the economy to construction activity –</p> <p>Explanation of three of the following ways:</p> <ul style="list-style-type: none"> • Fluctuations in demand for new private and social housing, commercial/industrial buildings and associated infrastructure/services caused by government 	

	<p>policy/consumer confidence etc.(1). Implications for decision to buy or rent properties/offices etc. (1).</p> <ul style="list-style-type: none"> • Fluctuations in demand for land caused by reduced/increased order books, regeneration areas with housing for key workers, affordable/social housing when companies have (re)located their business etc. (1). Implications for developers etc to increase or reduce their land bank (1). • Fluctuations in demand for materials/component/tool suppliers etc. caused by an increase/decrease in work load (1). Implications for the price of materials etc. due to supply and demand as less or more companies will be operating in the sector (1). • Fluctuations in demand for labour with implications for workers to enter or leave the sector (1). Would affect a company's long and short term planning and capacity to tender/undertake work (1). • Fluctuations in demand for education and training caused by companies increased/decreased workloads (1). The number and level of skilled workers available would affect a company's capacity to tender/undertake work particularly in an upturn of the economy (1). • Fluctuations in the cost of land, houses/commercial/industrial buildings, materials, labour, plant etc. usually caused by local factors that affect supply and demand.(1) Implications for reduction/rise in price of the overall project etc. (1). • Fluctuations in the number of companies in the sector due to availability of work, or niche markets i.e. social housing, retirement homes, government initiatives etc.(1). Companies going out of business/merging with others/being taken over etc. (1). • Fluctuations in the number of investors in the sector due to potential profit margins (1). 	
--	---	--

	<p>Government policy/interest rates etc, affecting confidence i.e. buy-to-let, attractiveness of other forms of investment (1).</p> <ul style="list-style-type: none"> • Fluctuation of available finance caused by changing interest/mortgage rates etc (1), confidence of banks to lend money to businesses to fund construction projects and contractors to expand (1). • Increased risk of business failure due to cash flow problems, unprofitable or no work (1), caused by a change in Government policy/funding Building Schools for the Future etc., the failure of other companies owing money, uncompetitive tender prices (1) • Fluctuations in public spending by central/local government on infrastructure caused by prioritising the available budget (1), leading to an increase/decrease in work and potential profit levels (1). • Fluctuation in tender price levels caused by the number of projects available to tender for (1), leading to an increase in tender prices when companies have a plentiful supply of work and conversely a decrease when companies lower margins to win contracts and so maintain turnover and consistent levels of staff (1). • Potential mothballing of speculative projects. • Companies can reach maximum capacity during times of boom restricting their capacity for work. <p>Any other appropriate answer. No marks for identification only 1 mark for a brief explanation 2 marks for a detailed explanation</p>	<p>(6)</p>
--	---	-------------------

Question Number		Indicative Content
7		<p>Benefits of the Decent Homes Programme –</p> <p>Coherent and balanced discussion of some of the following benefits:</p> <p>Homes will satisfy the current statutory minimum standard for housing in terms of:</p> <ul style="list-style-type: none"> • Fire regulation requirement • DDA requirement or the Equality Act • Current Building Regulations <p>Homes will be in a reasonable state of repair in terms of:</p> <ul style="list-style-type: none"> • No dampness • No ingress of water • The structure will be stable • All available measures to prevent decay of the fabric etc. have been taken. <p>Homes will have reasonably modern facilities and services in terms of:</p> <ul style="list-style-type: none"> • Sanitation • Kitchens that are less than 20 years old • Bathrooms that are less than 30 years old • Kitchens with adequate space • Appropriately located bathrooms and WCs • Adequate insulation against noise <p>Homes will provide a reasonable degree of thermal comfort in terms of:</p> <ul style="list-style-type: none"> • Effective insulation • Efficient heating <p>Any other appropriate answer.</p>
Level	Mark	Descriptor
	0	No rewardable material, no marks for identification only.
1	1-5	Description of one or two undeveloped and/or unsupported ideas. May lack cohesion. No discussion. Lacks appropriate terminology.
2	6-10	Clear description of four points for discussion or two points that have been fully discussed. Minimal use of appropriate terminology.
3	11-15	Discussion of four points not fully developed. Some use of appropriate terminology.
4	16-20	A good range and development of relevant points. Clear discussion. Sound use of appropriate terminology.

Further copies of this publication are available from
Edexcel Publications, Adamsway, Mansfield, Notts, NG18 4FN

Telephone 01623 467467

Fax 01623 450481

Email publication.orders@edexcel.com

Order Code DP030293 January 2012

For more information on Edexcel qualifications, please visit
www.edexcel.com/quals

Pearson Education Limited. Registered company number 872828
with its registered office at Edinburgh Gate, Harlow, Essex CM20 2JE

Ofqual




Llywodraeth Cynulliad Cymru
Welsh Assembly Government

