

L2 Lead Examiner Report 2001

January 2020

L2 Qualification in Engineering

Unit 9: Interpreting and Using Engineering Information

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What is a grade boundary?

A grade boundary is where we set the level of achievement required to obtain a certain grade for the externally assessed unit. We set grade boundaries for each grade, at Distinction, Merit and Pass.

Setting grade boundaries

When we set grade boundaries, we look at the performance of every learner who took the external assessment. When we can see the full picture of performance, our experts are then able to decide where best to place the grade boundaries – this means that they decide what the lowest possible mark is for a particular grade.

When our experts set the grade boundaries, they make sure that learners receive grades which reflect their ability. Awarding grade boundaries is conducted to ensure learners achieve the grade they deserve to achieve, irrespective of variation in the external assessment.

Variations in external assessments

Each external assessment we set asks different questions and may assess different parts of the unit content outlined in the specification. It would be unfair to learners if we set the same grade boundaries for each assessment, because then it would not take accessibility into account.

Grade boundaries for this, and all other papers, are on the website via this link:

<http://qualifications.pearson.com/en/support/support-topics/results-certification/grade-boundaries.html>

Unit 9: Interpreting and Using Engineering Information

Grade	Unclassified	Level 1 Pass	Level 2		
			Pass	Merit	Distinction
Boundary Mark	0	10	20	30	40

Introduction

This report has been written by the Lead Examiner for BTEC Engineering Unit 9 – Interpreting and Using Engineering Information. It is designed to help you understand how learners performed overall in the exam. For each question, there is a brief analysis of learner responses. You will also find some example learner responses for some questions. We hope this will help you to prepare your learners for future examination series.

General Comments on Exam

This was the thirteenth examination for Unit 9: Interpreting and Using Engineering Information (21174E). Learner responses seen this year were slightly weaker than the previous January series. Lower ability learners are still giving inaccurate and/or simplistic responses to questions and therefore limiting their opportunity to gain higher marks. The more demanding questions provided learners with an opportunity to apply their knowledge in response to a range of engineering scenarios; however, most learners were not able to give appropriate expansions to their answers that focused upon the given vocational context. Learners would, however, continue to benefit from being taught examination skills and techniques as some continued to misread the questions and consequently some were not answered using an appropriate methodology. It was also evident that some centres had not covered the unit content in its entirety, as many learners struggled to offer valid responses to gain marks which should have proven to be accessible to all learners. The learner responses relating to the given question on 'bend allowances' indicated that many learners may not have covered this particular area in their preparation for the externally set assessment.

Many learners, however, had greater success with a number of the multiple-choice questions which was pleasing as many aspects had been seen in previous series.

Question 1

This question gave learners the opportunity to use their knowledge and understanding to identify the features of engineering drawings along with the characteristics and applications of engineering related documentation.

Targeted Specification Area: Learning Aim A.1

Q1(a): The majority of learners were able to correctly identify at least one of the two features of a company standardised layout used for engineering drawings. The correct responses for this question are Title Block and Parts List. Title Block was the most common correct response selected by learners.

Targeted Specification Area: Learning Aim B.2

Q1(b): Learners were asked to identify two other types of working instruction used by engineers after they were given the example of 'job card' as a working instruction within the body of the question. Many learners struggled with this question offering a wide range of incorrect responses. Incorrect responses given by learners included 'Gantt Charts', 'PPE' or examples of PPE and the duplication of their initial answer. An example of this is shown below where the learner gave two forms of manual, manufacturers and instruction. The example therefore only had one correct response, 'manufacturers manual' and subsequently achieved one mark from the mark scheme.

Example of a 1 mark response shown below:

A job card is one type of working instruction used by engineers.

(b) State **two other** types of working instruction used by engineers.

(2)

1 *Manufacturers manual*

.....

2 *instruction manual*

.....

Targeted Specification Area: Learning Aim A.2

Q1(c): Question 1(c) proved to be very accessible for learners. The majority of learners were able to correctly answer question 1 (c) where they were asked to identify one electrical circuit characteristic from four given options. The correct response for this question is 'current'

Example of a 1 mark response shown below:

(c) Identify **one** electrical circuit characteristic that could be shown on an engineering drawing.

- A** Current
- B** Distance
- C** Coating
- D** Diameter

Targeted Specification Area: Learning Aim B.2

Q1(d): Learners were asked to state two types of document that can be used to schedule manufacturing activities. The majority of learners were able to state one type of document with many learners giving the correct response of Gantt Chart. Overall it was evident that this area of the unit specification had been well delivered by centres.

Example of a 2 mark response shown below:

(d) State **two** types of document that can be used to schedule manufacturing activities.

1 Gantt chart

2 Critical Path Analysis

Question 2

Question 2 examined the learner's knowledge of the characteristics of health and safety signage and the interpretation of drawing information (Linetypes).

Targeted Specification Area: Learning Aim A.4

Q2(a): This was a line match question and nearly all of learners were able to correctly match both warning signs to the correct warning sign name. The two correct responses were 'slippery surface' and 'risk of explosion'. Once again it was evident that learners had a thorough understanding of this area of the unit specification.

Example of a 2 mark response shown below:

- 2 Engineers refer to a range of different types of information when carrying out manufacturing activities.

(a) Identify the correct name for each of these warning signs.

Draw **one** line from each warning sign to **one** warning sign name.

(2)

Warning sign



(Source: © art-sonik/Getty Images)



(Source: © alessandro0770/Getty Images)

Warning sign name

Danger of death

Caution

Slippery surface

High voltage

Risk of explosion

Targeted Specification Area: Learning Aim A.4

Q2 (b) Learners were asked to name one example of a safe condition health and safety sign. This question was answered well by most learners; however, many learners gave examples of mandatory signage, particularly the use of PPE.

Example of a 1 mark response shown below:

(b) Name **one** example of a safe condition health and safety sign.

(1)

first aid

Example of a 0 marks (incorrect) response shown below:

(b) Name **one** example of a safe condition health and safety sign.

(1)

Wear protective glasses

Targeted Specification Area: Learning Aim A.2

Q2 (ci and cii) Learners were asked to identify two linetypes from a given orthographic engineering drawing. The majority of learners were unable to identify both linetypes to gain the maximum two marks. Many learners who gained one mark used the response centre line for both question 2(c)(i) and 2(c)(ii). It was evident that the format of the cutting plane linetype in terms of structure and position served to confuse many learners. To gain two marks for for question 2(c)(i) learner responses would need to be 'cutting plane' or 'cross section' or 'section'. For 2(c)(ii) learner responses would need to be 'centre line', 'centerline', 'centre' or 'CL'.

Example of a 1 mark response shown below:

(c) Figure 1 shows a drawing for an engineered component.

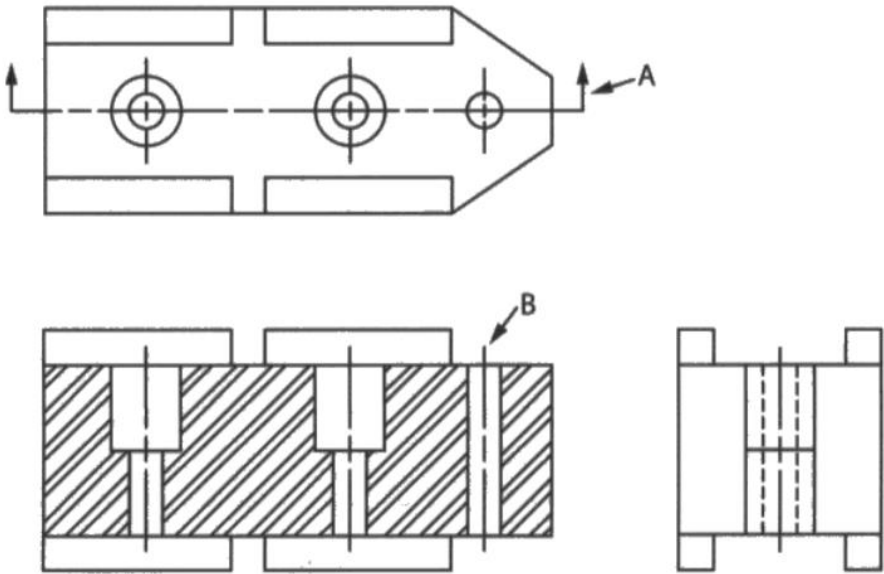


Figure 1

(i) Name the linetype indicated by the letter A.

..... Centre line

(ii) Name the linetype indicated by the letter B.

..... Centre line

Question 3

This question examined learner understanding of the interpretation of drawing information and of the use of drawing document care and control.

Targeted Specification Area: Learning Aim B.3

Q3(a): The majority of learners were able to correctly identify two places where engineering drawings can be stored safely. The correct responses for the question were 'Filing Cabinet' and 'ICT System'. One of the distractors selected by a number of learners was 'Machine Tray' which may have been wrongly misinterpreted as a document tray attached to a machine tool.

Targeted Specification Area: Learning Aim A.2

Q3(b): Learners were asked to state two reasons why electronic components are represented by symbols on circuit diagrams. This question was well answered by the majority of learners who were able to gain one or two marks for their responses. The learner example given has one correct response which relates to "saves time" from the mark scheme.

Example of a 1 mark response shown below:

(b) State **two** reasons why electronic components are represented by symbols on circuit diagrams.

(2) 1 Q03b

1 Prevents Mistakes (spelling mistake) .

2 takes less time , more time efficient .

Example of a 2 mark response shown below:

(b) State **two** reasons why electronic components are represented by symbols on circuit diagrams.

(2) 2 Q03b

1 Easier to understand as if every component was drawn realistically , the diagram would be complex

2 Allows any electrician with an understanding of the symbols to read a circuit diagram

Targeted Specification Area: Learning Aim B.3

Q3(c): The majority of learners were also able to name state two reasons why damage to engineering drawings should be reported. Learner responses were largely well detailed focusing upon the misinterpretation of drawing details and information and the requirement to produce new engineering drawings to replace the damaged ones.

Example of a 2 mark response shown below:

(c) State **two** reasons why damage to engineering drawings should be reported.

(2) 2

1 may lead to the product being inaccurate

2 New drawings will be needed to replace the damaged ones

Question 4

Question 4 focused upon learner knowledge and understanding relating to the interpretation of engineering drawings and the use of information sources that are relevant to specific engineering tasks.

Targeted Specification Area: Learning Aim A.2
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Q4(a): The majority of learners were able to correctly identify one or two reasons for the use of engineering drawings when repairing/modifying assemblies. This allowed learners to gain one or two marks from this question. The correct responses for question 4(a) were A and C.

Example of a 2 mark response shown below:

4 (a) Identify **two** reasons for using engineering drawings when repairing/modifying assemblies.

- A** To ensure the correct process is used
- B** To ensure the correct transportation is used
- C** To ensure the correct parts are used
- D** To ensure the correct packaging is used
- E** To ensure the correct scale is used

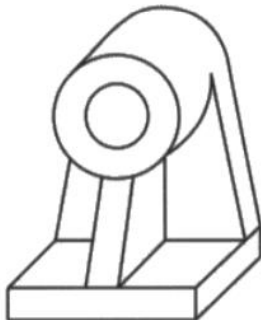


Targeted Specification Area: Learning Aim A.1

Q4(b): Question 4(b) was a line match question to determine the learner's ability to identify the correct name for two given engineering drawings. This question was not answered particularly well with many learners failing to identify one or both of the drawing types correctly. The distractors for this question were all plausible responses, however learners should have had sufficient knowledge to identify either 'Oblique' and/or 'Orthographic' to gain one or two marks for this question. This area of the unit specification should be regarded as a development point for some centres.

Example of a 2 mark response shown below:

(b) Identify the correct name for each type of drawing.

Draw **one** line from each type of drawing to **one** drawing name.

Type of drawing	Drawing name
	<input type="checkbox"/> Isometric
	<input checked="" type="checkbox"/> Oblique
	<input checked="" type="checkbox"/> Orthographic
	<input type="checkbox"/> Perspective
	<input type="checkbox"/> Schematic

Targeted Specification Area: Learning Aim A.2

Q4(c i): Learners who had been taught about welding symbols should have been able to recognise the type of weld indicated by the given symbol. Once again all of the distractors offered plausible responses for learners. Overall this question was not answered correctly by a significant number of learners who were unable to name the 'Plug' symbol shown.

Example of a 1 mark response shown below:

(c) Some components are modified by welding parts together.

(i) A welding symbol is shown in Figure 2.

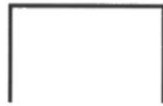


Figure 2

Name the type of weld indicated by the symbol in Figure 2.

(1) 1

- A Spot
- B Plug
- C Bead
- D Butt

Targeted Specification Area: Learning Aim A.3

Q4(c ii): Learners were asked to explain one reason why manufacturers data for the use of welding rods would need to be used when welding parts together. Two marks were available to learners who were able to give one reason supplemented by a linked response. This question was answered well by some learners; however, it was also evident that many learners had little or no understanding of this area of the unit content. Correct responses included welding methodology and processes ('type of weld') properties of welding rods, settings including weld angles, safety information and the physical dimensions of welding rods. Common incorrect responses by learners were generic responses using text from within the body of the question. In addition, many learners did not offer any response to the question.

Example of a 2 mark response shown below:

(ii) Explain **one** reason why manufacturers' data for the use of welding rods would need to be used when welding parts together.

(2) 2 Q04cii

they are checked because it depends on firstly the type of weld and the angles and places it is taken place and the strength of the weld compare to the actual material your using

(Total for Question 4 = 7 marks) **6**

Question 5

Question 5 was contextualised around a company that manufactures shelving systems that can be used in workshops and garages. The context gave learners an opportunity to apply their knowledge and understanding to the questions around specific applications of engineering information and documentation.

Targeted Specification Area: Learning Aim B.2

Q5(a): Learners were asked to state one advantage of using job cards when manufacturing parts for the shelving systems. This question was answered well by the majority of learners who were able to state appropriate advantages. Typical correct responses given by learners included quantities, tooling and equipment needed, a list of operations or processes and timings for manufacturing.

Example of a 1 mark response shown below:

(a) State **one** advantage of using job cards when manufacturing parts for the shelving systems.

(1) 1 Q05a

A Job card can be used to know how long it took to manufacture the shelving system.

Targeted Specification Area: Learning Aim A.3

Q5(b): Overall question 5 (b) was not answered particularly well by learners. The context of the question was completely misinterpreted by the majority of learners who wrongly assumed that 'bend allowance' related to the weight bearing capacity of the shelving. Learners should have referenced the addition of extra material to leg lengths in order to develop a correct flat pattern when applying bend allowance. Correct responses given by learners related to reducing waste material and the reduction of mistakes in manufacture. It was evident that this particular part of the unit content may not have been particularly well covered by many centres in their delivery of unit 9.

Example of a 2 mark response shown below:

(b) Explain **one** reason why engineers would need to refer to information about bend allowances when manufacturing parts for the shelving systems.

(2)

before a material is bent it is marked and additional leg length is added depending on angle of bend, metal thickness and radius of bend. Engineers need to refer to information about bend allowance to make sure the initial size of parts bend to length that is specified. So the parts will be ~~made~~ at the correct angle, shape and size once bent.

Targeted Specification Area: Learning Aim A.1

Q5(c): Question 5 (c) was more accessible for learners. Greater understanding was reflected in the learner responses to this question. Learners were able to gain marks through typical learner responses which included information on the identification of individual parts, the ability to identify missing parts and the sequence in which parts should be assembled. Although many learners were able to identify advantages, they were unable to gain additional marks for an appropriate expansion or linked response. Learners who did not score marks in the 3-4 range often repeated their original response for a second advantage. The example shown gains 2 marks for 2 low level responses.

Example of a 2 mark response shown below:

(c) BE9 Engineering supplies customers with exploded diagrams of the shelving systems.

Explain **two** advantages to customers of being supplied with an exploded diagram.

(4) 2 Q05c

1 You will know where exactly the parts will go so it can be assembled in the correct way.

2 Also to see what parts ~~you~~ you will need at if ~~the~~ there is a little part, ~~so~~ you will know what and when it is.

Example of 4 mark response shown below:

(c) BE9 Engineering supplies customers with exploded diagrams of the shelving systems.

Explain **two** advantages to customers of being supplied with an exploded diagram.

(4) 4 Q05c

1 It shows all the components that are necessary to build the shelves and means the ~~customer~~^{customer} can see anything missing at any point.

2 It clearly shows how to assemble the shelves correctly which means the customers are less likely to make any mistakes while assembling the shelves as they have instructions.

(Total for Question 5 = 7 marks) **4**

Question 6

Question 6 was contextualised around a company that manufactures customised controllers to be used with game consoles. The use of this context gave learners an opportunity to apply their knowledge and understanding of unit 9 learning aims to a range of questions.

Targeted Specification Area: Learning Aim B.2
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Q6(a): Question 6 (a) proved to be a challenging question for a significant number of learners. This was largely attributable to the misinterpretation of the question. It was imperative that learners read the question fully to ensure full understanding to offer a correct response. The question stated that SK1 manufactures 'customised controllers', however, the manufacturers manuals were for the game consoles. This misled many learners who often offered responses relating to 'user manuals' on setting up of the system for home use or as a troubleshooting guide.

Where learners had fully understood the context of the question, appropriate advantages were given. This led to some learners giving a linked response to achieve a further mark. An example of this is shown in the 2 mark response given where the learner relates knowledge of the specifications/details to enable a correct match.

Example of 1 mark response shown below:

6 SK1 Engineering manufactures customised controllers to be used with game consoles. The game consoles are supplied with a manufacturers' manual.

(a) Explain **one** advantage of SK1 Engineering referring to manufacturers' manuals in this situation.

(2) **1** Q06a

The manufacturer's manual makes the customisation much quicker as they already have the lay-out from the manual

Example of 2 mark response shown below:

- 6 SK1 Engineering manufactures customised controllers to be used with game consoles. The game consoles are supplied with a manufacturers' manual.
- (a) Explain **one** advantage of SK1 Engineering referring to manufacturers' manuals in this situation.

(2) Q06a

It lets them know the specific specifications and details of the console, so that they can match the components ~~to~~ the correctly to the console.

Targeted Specification Area: Learning Aim B.1

Q6(b): Question 6(b) was well answered by some learners who demonstrated a good understanding of the implications of not producing quality control documentation. Many learners were able to identify one or two implications with some learners offering an appropriate expansion. The 2 mark example shown is a typical example where the learner mentions the lack of checks in both responses. The learner gains marks for safety risks to end users (1 mark) and faulty products reaching the end user (1 mark). The 4 mark example gives two linked responses. Faulty products reaching the end user (1 mark) and the increased financial cost (1 mark). Identification of mistakes in production (1 mark) and inability to make improvements (1 mark).

Example of a 2 mark response shown below:

SK1 Engineering does not produce quality control documentation for the customised controllers that it manufactures.

(b) Explain **two** implications for SK1 Engineering of **not** producing quality control documentation.

(4) **2** Q06b

1. It implies that not all their products are checked for safety and quality which could be dangerous to the customers as they could blow up.

2. It also implies they don't care about their products and customers so they don't check their products from beginning to end meaning they may not be very good.

Example of a 4 mark response shown below:

SK1 Engineering does not produce quality control documentation for the customised controllers that it manufactures.

(b) Explain **two** implications for SK1 Engineering of **not** producing quality control documentation.

(4) 4 Q06b

- 1 Faulty controllers could be purchased by a customer who then wants a refund, this would cost the company more money than modifying it before it left the factory.
- 2 Not producing a quality control document would not be company where mistakes were being made, this would mean that it is more difficult for the company to solve the issue.

Targeted Specification Area: Learning Aim B.2

Q6(c): Question 6(c) related to the advantages of an engineering organisation sharing scheduled milestones with their suppliers. Many learners were able to identify advantages to gain 1-2 marks for the question. Typical learner responses included 'knowing where parts are' 'supplying on time' and 'avoiding delays'. Higher achieving learners were able to offer appropriate expansions gain 3 or 4 marks for their responses as shown in the examples below. The 3 mark example shows a linked response for question 6(c)2 of actions relating to delays through the amending of schedules. It was evident that this area of the unit specification had been well delivered by centres.

Example of a 3 mark response shown below:

(c) SK1 Engineering uses milestones when scheduling the manufacture of the customised controllers.

Explain **two** advantages of SK1 Engineering sharing scheduled milestones with its suppliers.

(4) **3** Q06c

1 This will help to identify deadlines keeping production on time, therefore allowing delivery of products to be completed on time

2 If there are any delays on a particular task of the job, the scheduled milestones can be amended allowing the project to be completed at a later time

The example given where the learner response achieves 4 marks for two linked response covers management of stock and cost savings (c)1 and part availability when expected through identification of deadlines (c)2.

Example of a 4 mark response shown below:

(c) SK1 Engineering uses milestones when scheduling the manufacture of the customised controllers.

Explain **two** advantages of SK1 Engineering sharing scheduled milestones with its suppliers.

(4) 4 Q06c

1 It allows them to receive supplies when they need them rather than buy it all at the beginning and have to find space to store it.

2 It also forces them to keep to the schedule otherwise the line of their inputs will be off to the line they are producing meaning they have to stick to their schedule to keep everything on track and this benefits the customer also as they receive it on time.

Question 7

Question 7 was contextualised around a company that had manufactured many different versions of a lawn mower over a period of 60 years. Learners were asked to discuss the reasons why the company uses specific document control methods for its lawn mower engineering drawings and documentation.

Targeted Specification Area: Learning Aim B.3

Q7: The majority of learners did not find question 7 particularly accessible. Within the body of the question learners were asked to discuss specific 'document control' methods. Unfortunately, many learners focused upon the location and security of engineering documentation. This area of the unit specification was covered by questions 3(a) and 3(c) in the examination. A limited number of learners did include reference to issue and amendment dates, however learner responses overall related to the location and storage of engineering documentation covering areas such as filing cabinets and ICT systems and the ability to transfer documentation electronically. Additional responses given by learners related to continuous improvement activities, data protection and product confidentiality. The majority of the marks that were achieved by learners for question 7 were in the lower mark bands of level 1 and level 2.

Example of a mark band 1 response shown below:

- 7 WR14 Engineering has manufactured many different versions of a lawn mower over a period of 60 years.

1 Q07

Discuss the reasons why WR14 Engineering uses specific document control methods for its lawn mower engineering drawings and documentation.

I believe WR14 uses ~~specific~~ specific document control methods for their drawings and documentation in order for them to manage and secure their drawings and documentation effectively. For instance, storing their drawings online would allow WR14 to control who can access, edit or save these drawings as well as reducing storage costs as they are not using paper copies. Also using these control methods allows WR14 to see drawings easily in case a particular model of lawn mower is ~~faulty~~ faulty and therefore compare the drawing and the model to find the issue.

Example of a mark band 2 response shown below:

- 7 WR14 Engineering has manufactured many different versions of a lawn mower over a period of 60 years.

Discuss the reasons why WR14 Engineering uses specific document control methods for its lawn mower engineering drawings and documentation.

One control method may be to store the drawings and documentation securely on an ICT system, ~~with~~ or at least store the master ^{copy} copies there, so that copies can easily be made and also if any damage were to come to the paper copies and there was no back up it would be very costly and time wasting to draw up all new ones. This control method would increase security and efficiency.

As the company has had many different versions over quite a lot of time documents would need to be labelled quite in detail so it would be easy and clear to see each specific specification and from what year so that there are no mix ups or mistakes made in terms of current production but also if any queries arose in regards to previous specifications of the product it would be efficiently controlled and they could find the details of that specification quickly and it could be found by any of the employees if necessary.

However another control method could be that only senior members of the company may have access to current and previous drawings and documentation.

(Total for Question 7 = 8 marks)

Example of a mark band 3 response shown below:

7 WR14 Engineering has manufactured many different versions of a lawn mower over a period of 60 years.

Discuss the reasons why WR14 Engineering uses specific document control methods for its lawn mower engineering drawings and documentation.

Specific document control methods include how it should be stored and where it should be stored.

One advantage of using specific document control methods for drawings and documentation is that the company has the most up to date version of the lawn mower drawings. Drawings have version numbers on them, so when a drawing is updated, it gets a new number, date when created and a signature saying it has been checked. This allows you to ~~check~~^{trace} back to the original copy if there are faults with the newer version, also makes sure if company is using most up-to-date version of lawn mower drawings, and the older drawings are archived or discarded.

Another advantage is that change notes are issued with specific document control methods. So if there has been a modification to the drawing or document, a note will be issued to all the key departments in the company that use the document or drawing, the note will have to be signed in order to prove the manufacturer's knowledge of the change in documents. This means all departments will know about the change and won't use the incorrect drawing.

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