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The Design of Student Worksheets on Integer Material Using the Context of Musi Rawas Tourism

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Abstract: This study aims to design student worksheets on integer material using the context of Musi Rawas tourism. The designed worksheets are expected to provide students with a more engaging and relevant learning experience by incorporating real-life examples and problems related to the local tourism industry. This study uses a design research method with validation studies, including *preliminary design and the design experiment (pilot experiment)*. The results of this study show that the designed worksheets effectively integrate integer concepts with the context of Musi Rawas tourism, making the learning experience more meaningful and enjoyable for students. The study concludes that contextualised learning materials, such as these worksheets, can significantly enhance students' understanding and retention of mathematical concepts.

Keywords: Student Worksheets; Integer; Tourism.

Realitas Desain Lembar Kerja Siswa pada Bahan Bilangan Bulat Menggunakan Konteks Pariwisata Musi Rawas

Abstrak: Penelitian ini bertujuan untuk merancang lembar kerja siswa pada materi bilangan bulat dengan menggunakan konteks pariwisata Musi Wasis. Lembar kerja yang dirancang diharapkan dapat memberikan siswa pengalaman belajar yang lebih menarik dan relevan dengan memasukkan contoh kehidupan nyata dan masalah yang terkait dengan industri pariwisata lokal. Penelitian ini menggunakan metode penelitian desain dengan studi validasi, antara lain *desain pendahuluan dan eksperimen desain (pilot experiment).* Hasil penelitian ini menunjukkan bahwa lembar kerja yang dirancang secara efektif mengintegrasikan konsep bilangan bulat dengan konteks pariwisata Musi Rawas, membuat pengalaman belajar lebih bermakna dan menyenangkan bagi siswa. Studi ini menyimpulkan bahwa materi pembelajaran kontekstualisasi, seperti lembar kerja ini, dapat secara signifikan meningkatkan pemahaman dan retensi siswa terhadap konsep matematika**.**

Kata Kunci: lembar kerja siswa; integer; pariwisata.

INTRODUCTION

Designing student worksheets holds immense significance in creating an effective and engaging learning environment in the elementary school setting. Incorporating a context that resonates with students can significantly enhance their understanding and application of the subject matter when teaching integer concepts. This essay aims to explore the design of student worksheets on integer material using the context of Musi Rawas tourism, a region known for its captivating natural landscapes and cultural heritage. By integrating this context

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into the worksheets, we can provide students with a unique and immersive learning experience that connects mathematics to their real-world surroundings.

Research has shown that contextual learning is vital in promoting meaningful and long-lasting knowledge acquisition (Bransford et al., 2000). Students can develop a deeper understanding of integers and their applications by presenting mathematical concepts within a real-world context, such as Musi Rawas tourism. This approach allows students to see the relevance of mathematics in their daily lives, fostering their engagement and motivation in learning (Stipek, D. J. 2002). The process of learning mathematics cannot be separated from the nature of the student's interaction with the social environment (Nur, A. S., Kartono, Zaenuri, & Rochmad, 2022). Moreover, contextual learning encourages students to transfer knowledge to new situations, improving their problem-solving abilities (Resnick, L. B. 1989).

The problem of number learning prompted previous researchers Muslimin, et al. (2012) and Faznur, L. S. et al. (2020) to identify difficulties in learning numbers, including subtraction material with negative numbers is very abstract for students; then, students experience misconceptions in number learning. In line with the previous opinion (Sun, X. H., 2018), learning number concepts is a misleading subject. Efforts to overcome problems that have been identified, according to Rahmatin, R., & Khabibah, S. (2016), using games in learning that are associated with everyday life (context), the use of context provides two essential aspects, namely exciting and educational.

The use of Musi Rawas tourism as a context for designing student worksheets provides numerous opportunities to engage students in meaningful mathematical activities. The student worksheets aid students in comprehending the content concepts and process skills they will be studying (Dewi et al., 2023; Nurfadhillah et al., 2018). For instance, students can explore various aspects of tourism, such as calculating distances between tourist attractions, estimating expenses for accommodation and transportation, or analysing visitor statistics for popular sites. These activities reinforce mathematical skills and promote critical thinking, logical reasoning, and data analysis (Hiebert, J., & Grouws, D. A., 2007). Additionally, incorporating elements of the local culture, landmarks, and tourist attractions in the worksheets can captivate students' interest and make learning more enjoyable (Hofstein, A., & Lunetta, V. N., 2004).

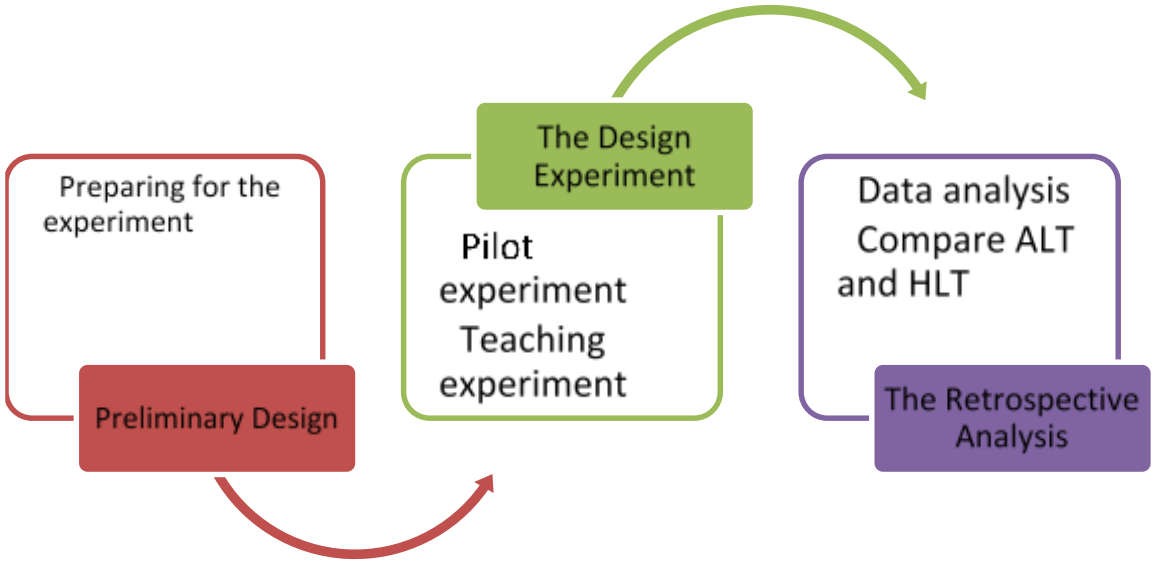
The design of student worksheets using the Musi Rawas tourism context fosters the development of essential problem-solving and decision-making skills. By presenting real-life scenarios and challenges, students are encouraged to apply their mathematical knowledge to solve problems in a practical context. This approach enhances their ability to analyse information, make informed decisions, and communicate their reasoning effectively (NCTM, 2000). Moreover, students can develop a deeper appreciation for the value and applications of mathematics in everyday life, which can motivate them to pursue further studies in the subject.

The design of student worksheets on integer material using the context of Musi Rawas tourism offers a promising approach to enhancing mathematics education in elementary schools. These worksheets connect mathematics and students' daily experiences by integrating real-life scenarios and cultural elements. Through engaging in activities related to Musi Rawas tourism, students can develop a deeper understanding of integer concepts, improve their problem-solving skills, and appreciate the practical applications of mathematics. By embracing this innovative approach, we can inspire a love for learning, promote mathematical literacy, and prepare students for success in their academic journey and beyond.

METHOD

The study utilises a design research approach, which includes preliminary design and the design experiment (pilot experiment). Design research is a research approach designers use to understand context, identify the problem, and produce insights to form a design process and produce effective solutions. This involves exploring, understanding, and testing to understand better the needs and challenges in a specific design context (Buchanan, R., (2001), Laurel, B. (2003), & Norman, D. A. (2013)).

The stages in the research design research consist of 3 (see Figure 1), including preparing for the experiment (preliminary design), the design experiment (pilot experiment and teaching experiment), and the retrospective analysis (Reeves, T. C. et al., (2004) and Heuvel-Panhuizen, M. D. (2003)).



Preliminary Design Stage: at this stage, the researcher reviews the literature and designs the HLT. In the literature review stage, the researcher examines research on elementary school mathematics learning and PMRI learning activities. Field observations were conducted by conducting preliminary research on Elementary Schools to determine whether students were familiar with PMRI learning. Furthermore, according to the literature review, the researchers designed the HLT with the teacher and created learning tools that support HLT (test instruments, activity sheets, and lesson plans).

Design Experiment Stage: the researchers carried out the Pilot Experiment at this stage. In the pilot experiment stage, six students will be selected representing different abilities from 2 different schools to solve the problems that have been designed; this stage plays a role in bridging the Preliminary Design stage with the Design Experiment stage, which aims to: 1) investigate the initial abilities of research subjects regarding the learning material to be studied. Designed, 2) Adapting to HLT based on supporting data.

RESULT AND DISCUSSION

In the Preliminary Design stage, the researcher first reviews the literature on learning mathematics in addition to subtraction of integers using a realistic mathematical approach and designs the Hypothetical Learning Trajectory (HLT). In addition, researchers examine the curriculum, lesson plans, learning activities, and the use of learning media following integer learning. Conduct observation activities and discuss with colleagues related to integer learning activities, students' abilities in the addition of fractions, and research implementation schedules. Researchers designed the HLT according to the results of the literature review and also designed activity sheets and lesson plans.

Based on the preliminary design stage, the student worksheets are designed for grade 4 with essential competencies and competency achievement indicators as follows:

●Explain and assess the number, difference, and product of two numbers and fractions

●Solve the problem of estimating the sum, difference, or product of two numbers or fractions

The learning objectives of integer learning are as follows:

Given problems with the tourism context in Musi Rawas, students can:

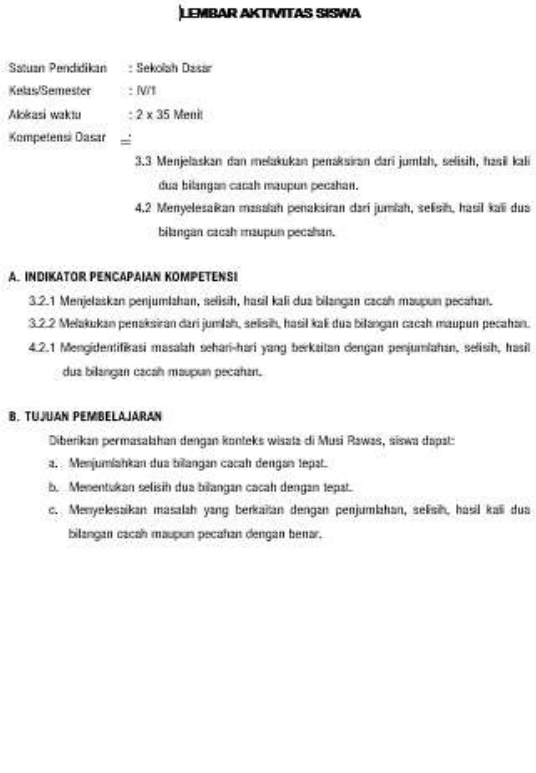
1. Sums two numbers correctly.
2. Correctly determine the difference between two numbers.
3. Solve problems related to addition, difference, and product of two numbers or fractions correctly.

To achieve essential competencies, indicators of competency achievement, and learning objectives, researchers design HLT, which is presented in Table 1

Table 1. Hypothetical Learning Trajectory.

Activity	Learning objectives	Activity Description	Student Thought Conjecture
Relate addition and subtraction to real-life tourism scenarios, such as calculating the total number of visitors or expenses for a trip.	Students can sum and subtract two numbers correctly based on the problems in the tourism context that has been given.	Count/decompose the number of tickets and Required time and then make them into mathematical symbols.	Students can interpret the addition and subtraction operations of integers to the problems given and be able to provide explanations for the answers given.
Turn task instructions into word problem-solving structures	Students can correctly solve problems related to addition, difference, and product of two numbers or fractions.	Transform the result of the problem given into sentences containing word problems.	Students can provide opinions and solutions to the problem given and be able to offer explanations for the answers given

Figure 2 below is a design of student worksheets on number material using the Musi Rawas tourism context.



LEMBAR AKTIVITAS SISWA

Satuan Pendidikan : Sekolah Dasar
Kelas/Semester : IV/1
Alokasi waktu : 2 x 35 Menit
Kompetensi Dasar :

3.3 Menjelaskan dan melakukan penaksiran dari jumlah, selisih, hasil kali dua bilangan cacah maupun pecahan.
4.2 Menyelesaikan masalah penaksiran dari jumlah, selisih, hasil kali dua bilangan cacah maupun pecahan.

A. INDIKATOR PENCAPAIAN KOMPETENSI

3.2.1 Menjelaskan penjumlahan, selisih, hasil kali dua bilangan cacah maupun pecahan.
3.2.2 Melakukan penaksiran dari jumlah, selisih, hasil kali dua bilangan cacah maupun pecahan.
4.2.1 Mengidentifikasi masalah sehari-hari yang berkaitan dengan penjumlahan, selisih, hasil dua bilangan cacah maupun pecahan.

B. TUJUAN PEMBELAJARAN

Diberikan permasalahan dengan konteks wisata di Musi Rawas, siswa dapat:

a. Menjumlahkan dua bilangan cacah dengan tepat.
b. Menentukan selisih dua bilangan cacah dengan tepat.
c. Menyelesaikan masalah yang berkaitan dengan penjumlahan, selisih, hasil kali dua bilangan cacah maupun pecahan dengan benar.

(a)

C. PERMASALAHAN 1:

Apakah kamu pernah berwisata ke Danau Aur? Perhatikan gambar di bawah ini!

Gambar 1. Pintu Gerbang Tempat Pembelian Tiket Masuk Danau Aur

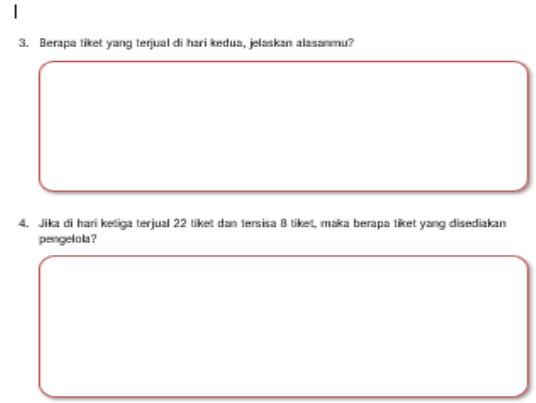
Menjelang liburan pengelola wisata danau aur menyediakan tiket secara online. Pada hari pertama terjual 220 tiket, hari kedua terjual setengah dari tiket yang tersisa dan pada hari ketiga terjual 22 tiket. Jika tersisa 8 tiket, maka berapa tiket yang disediakan pengelola?

Kerjakan permasalahan di atas dengan mengikuti langkah-langkah di bawah ini!

1. Perkirakan jumlah tiket yang disediakan pengelola dengan memisalkan sebagai huruf sesuai pilihan mu (boleh huruf ***a***, ***b***, ***x*** atau yang lainnya)!

2. Tentukan tiket yang terjual di hari pertama!

(b)



3. Berapa tiket yang terjual di hari kedua, jelaskan alasanmu?

4. Jika di hari ketiga terjual 22 tiket dan tersisa 8 tiket, maka berapa tiket yang disediakan pengelola?

(c)

PERMASALAHAN 2:

Gambar di bawah ini merupakan foto Danau Air dari udara

Gambar 2. Danau Aur dari udara

Saat berkunjung ke Danau Aur jangan lupa untuk singgah ke perpustakaan Terapung yah, **sambil menyusuri danau tak lupa membaca buku**, asyik kan.

Gambar 3. Perpustakaan Terapung

(d)

(e)

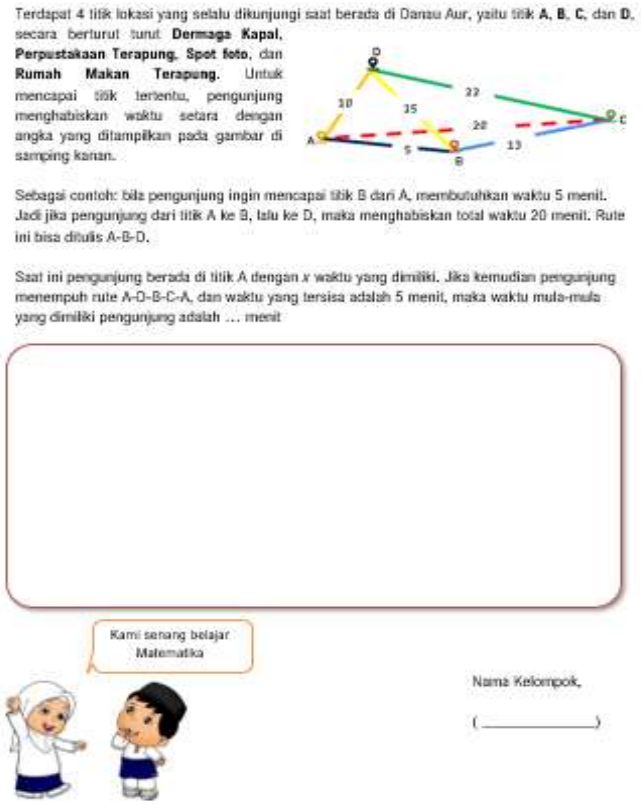


Figure 2. Student worksheets on number material using the Musi Rawas tourism

Figure 2 (b) presents a problem: "Ahead of the holiday, the Aur Lake tour manager provides tickets online. On the first day, 220 tickets were sold; on the second day, half of the remaining tickets were sold; on the third day, 22 tickets were sold. If eight tickets are left, how many will the manager provide?" To solve the given problem, students are guided to follow the solving steps provided on the student worksheet as follows:

1. Estimate the number of tickets the manager provides by supposing letters of your choice (*a, b, x,* or others)!

2. Determine the tickets sold on the first day!

This step trains students to understand the problems and then make estimates by making examples using letters according to student choice. This step is considered necessary because students' ability to make estimates is one of the factors in critical thinking skills (Sukoyanti, Baiq A., & Sufianti, Ika. 2017).

3. How many tickets were sold on the second day? Explain your reason.

4. If, on the third day, 22 tickets are sold and eight tickets are left, then how many tickets will the manager provide?

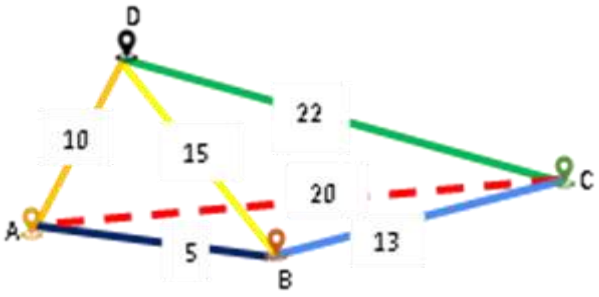
This step trains students to count/decompose the number of tickets.

Figure 2 e presents a problem: 4 locations are always visited in Aur Lake, namely points A, B, C, and D, namely Ship Pier, Floating Library, Photo Spot, and Floating Restaurant. Visitors spend the equivalent of the number shown in the image on the right to reach a certain point.

For example, if a visitor wants to reach point B from A, it takes 5 minutes. So if the visitor is from point A to B, then to D, spend 20 minutes. This route can be written A-B-D.

Currently, the visitor is at point A with x time owned. If the visitor takes the A-D-B-C-A route, and the remaining time is 5 minutes, then the initial time that the visitor has is a minute.

On this task, students are trained to solve problems related to addition, difference, and product of two numbers because elementary school students who have good problem-solving skills will be better prepared to face change and find creative solutions in the future (OECD. (2018), NCTM. (2020), & Deák, G. O., et al., (2019)).



Student worksheets were tested on six students with different abilities from 2 other schools.

Figure 3. Trial at SD Negeri 2 Muara Beliti

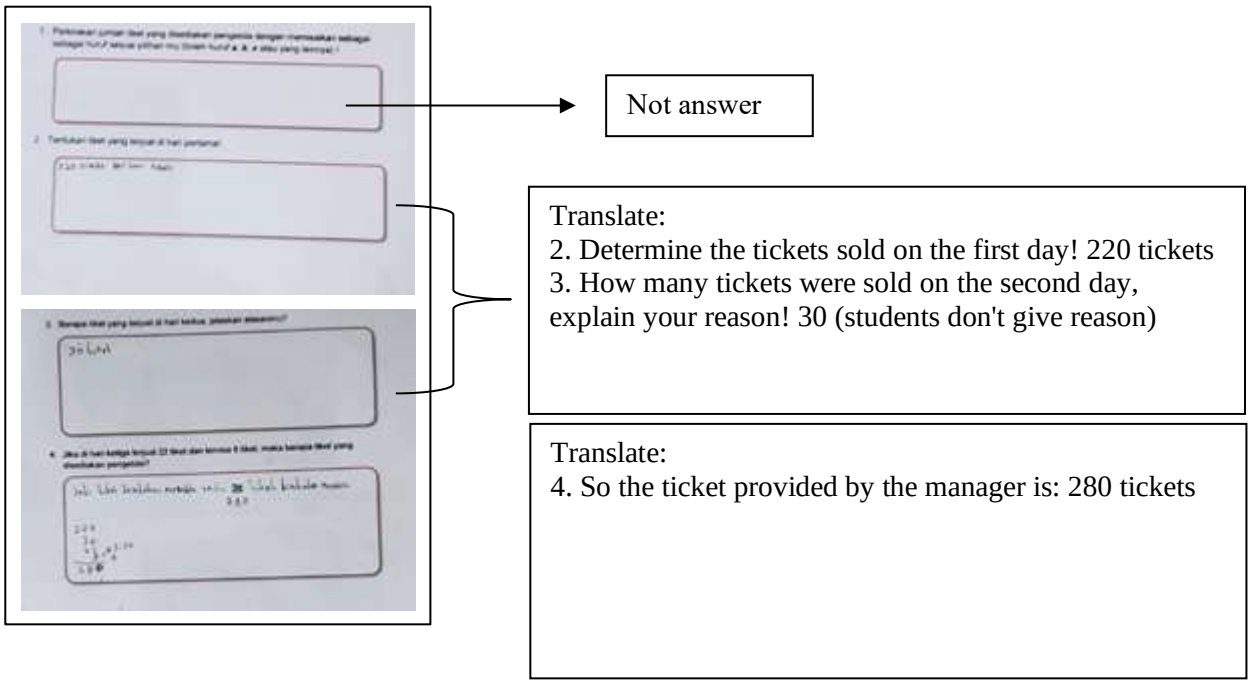


Figure 4. Student answers

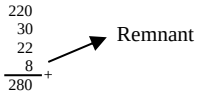


Figure 4. An example of an exciting student answer during the trial.

Something interesting about how students answer questions and solve the last problem after reading is that this shows that students have problem-solving skills but are not used to answering gradually. This ability is essential in developing logical, analytical, and reflective thinking in elementary school students (Kuo, et.al., 2017).

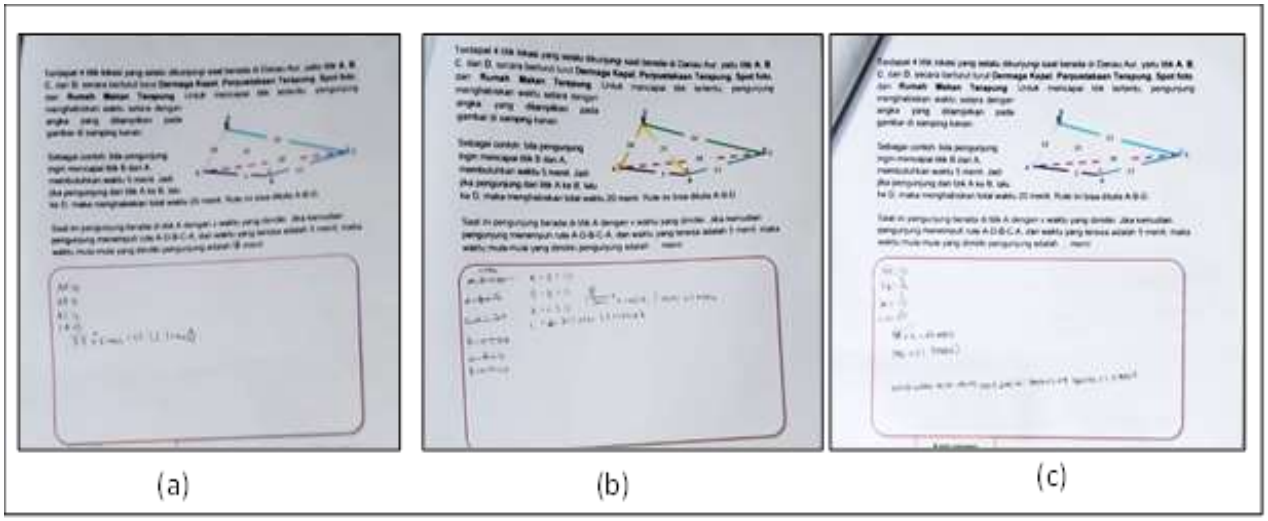


Figure 5. Student answers to problem 2

Based on Figure 5 (a), (b), and (c), students answered with almost the same strategy and produced the correct answer; when compared with the answers to question 1, it can be seen that students are not used to answering in stages, the steps given tend to confuse students. This follows the opinion (of Kaur, B. (2012), Russell, M. K., & Russell, L. (2019), & Vukovic, R. K., & Lesaux, N. K. (2013)) which states that several factors can cause students difficulty in following the work steps on student worksheets including 1) limited ability to process information, 2) difficulty self-regulating, 3) limited language skills in understanding the meaning of mathematical problems, and 4) lack of understanding of basic mathematical concepts.

CONCLUSION AND RECOMMENDATION

The design of student worksheets on integer material using the context of Musi Rawas Tourism offers several benefits for students. By incorporating local tourism aspects into the worksheets, students can deepen their understanding of integers while gaining insights into the cultural and natural heritage of Musi Rawas. This approach enhances relevance, engages students, cultivates cultural awareness, fosters problem-solving skills, and promotes collaboration and communication. By connecting mathematics with their local context, students develop a holistic understanding of the subject while appreciating the beauty and significance of their community's tourism industry.

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